TO EVALUATE BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN ORAL AND MAXILLOFACIAL INJURIES FOLLOWING RTA

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ORAL AND MAXILLOFACIAL SURGERY

THE TAMILNADU DR.MG.R.MEDICAL UNIVERSITY

CHENNAI - 600 032.

2016-2019

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **"TO EVALUATE BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN ORAL AND MAXILLOFACIAL INJURIES FOLLOWING RTA"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. K. PRABHUSANKAR, M.D.S.**, Professor, **Head of the Department,** Department of Oral and Maxillofacial Surgery, Best Dental Science College, Madurai - 625104

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"No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude."

- Alfred North Whitehead

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DECLARATION

TITLE OF DISSERTATION	TO EVALUATE BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN ORAL AND MAXILLOFACIAL INJURIES FOLLOWING RTA
PLACE OF STUDY	BEST DENTAL SCIENCE COLLEGE AND HOSPITAL AND RAJAJI GOVT. HOSPITAL, MADURAI
DURATION OF THE COURSE	3 YEARS
NAME OF THE GUIDE	DR. K. PRABHU SANKAR
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This agreement herein after the "Agreement" is entered into on this day Oct 2018, between the Best Dental College represented by its **Principal** having address at Best Dental Science College, Madurai-625104, (hereafter referred to as ,' the College')

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And

DR.ANI JOHN PETER, aged 45 years currently studying as **Post Graduate student** in Department of Oral and Maxillofacial Surgery, Best Dental College and Hospital, Madurai-625104 (herein after referred to as the 'PG/Research student and co-investigator')

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ABSTRACT

AIM

The aim of the study is to investigate the incidence of bacteriological profile and the antibiotic sensitivity pattern in oral maxillofacial injuries due to RTA.

MATERIALS AND METHODS

The present study on Oral Maxillofacial injury wound infections in RTA was carried out in the department of Oral and Maxillofacial Surgery, Best Dental Science College and Rajaji Medical College Madurai, over a period of one year (January 2017 to December 2017). A total of 100 clinical cases of oral maxillofacial injury in department of Oral and Maxillofacial Surgery of Best Dental science College and Rajaji Government College Madurai, were taken for the study.

RESULTS

In this study of 100 clinical cases of oral maxillofacial injuries in Road Traffic Accident of all ages and both sexes were studied over a period of one year from January 2017 to December 2017.Out of the 100 clinical cases of oral and maxillofacial injuries, 63 (63%) samples were culture positive gram growth and 37 (37%) were culture gram negative growth.

CONCLUSION

It was concluded that , in our studies the most common causative agent of oral and maxillofacial injuries in RTA was Staphylococcus aureus, followed by Klebsiella pneumoniae .

KEY WORDS

Bacteriological profile ,Maxillofacial injuries ,RTA.

LIST OF ABBREVIATIONS

ABBREVIATIONS	ACRONYM
RTA	Road Traffic Accidents
S.Aureus	Staphylococcus Aureus
S.Pyogens	Streptococcus Pyogens
E.Coli	Escherichia Coli
KL.Pneumoniea	Klebseilla Pneumonia
P.Vulgaris	Proteus Vulgaris
Proteus SPP	Proteus Species
Psuedomonas SPP	Pseudomonas Species
Propioni Bacterium SPP	Propioni Bacterium Species
PS aeuruginosa	Pseudomonas Aeuruginosa.
SSIS	Surgical Site Infection
MRSA	Methicillin Resistant Staphylococcus Aureus
MDR	Multiple Drug Resistance
CNS	Cogulase Negative Staphylo Cocci
OPD	Out Patient Department
CoNs	Coagulase, Negative Staphylococcus
MRCoNs	Methicillin Resistant Coagulase Negative Staphylococcus
MBL	Metallo - B - Lactamases

ESBL	Extended Spectrum β.Laetamases.
GPC	Gel Permeation Chromatography
MH	Muller Hinton Agar
CLSI guidelines	Clinical laboratory Standard Institute
MDR	Medical device Regulation
MIC	Minimal Inhibitory Concentration.

LIST OF TABLES

TABLE OF GRAPHS

LIST OF FIGURES

LIST OF ANNEXURES

S.NO	ANNEXURE LIST
1	Institutional Review Board Dissertation Approval Letter
2	Data Sheets
3	Information Sheet for those who Plan to Participate in this Research Project - Tamil
4	Information Sheet for those who Plan to Participate in this Research Project - English
5	Informed Consent Form 2
6	Thesis Case Sheet

CONTENTS

INTRODUCTION

INTRODUCTION

Accidents and trauma are one of the world's most serious but neglected health problem. The fast moving transportation systems, unprecedented and unplanned urbanization and changing social patterns have contributed to the global increase in the incidence of trauma to human body.[1] Traffic accidents are an endemic disease which affects mainly the young adults in the economically productive age groups and are the leading cause of death in persons under 44 years of age. Globally, 26% of all deaths in the age group of 15 - 44 years in 2002 were due to injuries.[2] The national vital registration system registers around 18 million deaths annually due to injuries worldwide.[3,4,12]

In India, trauma is a major problem, other accidental injuries, crime and violence. Rising population, urbanization, industrialization and a drastic rise in vehicular transport has contributed to an annual increase in road traffic accidents by 3%. The mortality rate has been increasing due to accidents in India. Despite this; trauma care is at a developmental stage in our country.[5]

Thus, there is a growing population of traumatized patients requiring highly sophisticated and specialized care in India and elsewhere. Infections are one of the most common and fatal complications following trauma which complicate the recovery of a significant number of injured patients.[6]

With the recent establishment of trauma care centers in India and a multidisciplinary approach to handle these patients, it is important to understand the epidemiology of infections, which will be the first step towards prevention and effective treatment.[7] The number and range of automobile accidents has increased over the recent decades and the rates of wound infections following RTA vary from one patient to another.

A wound is a type of injury in which a break in the skin is present and the exposure of the subcutaneous tissue and subsequent loss of skin integrity which provides moist, warm and nutritive environment for colonization and proliferation of microorganisms. A wound can be considered infected if purulent material is observed even without the confirmation of a positive culture. Infection in a wound delays healing, causes wound breakdown, dehiscence prolongation of hospital stays, increased trauma care and treatment costs. The wounds can be cut or punctured (open wound) or where blunt force trauma causes a contusion (closed wound). [8,9,4]

Wounds can further be classified as accidental, pathological or postoperative according to its nature. Certain parasites for example (Hookworm larvae) and bacteria which can penetrate intact skin, but certain primary skin infections like impetigo is caused by Streptococcus aureus or S. pyogenes, or both which gain access through abrasions, as minor trauma to skin is a part of everyday life.[10]

Bacteriological studies have also shown that wound infection is universal and that the bacteria types present vary with geographical location, bacteria resident on the skin, clothing at the site of wound time ofwound and examination. The virulence and invasiveness capability of the organisms have been reported to influence the risk of infection, but the physiological state of the tissue in the wound and the immunological integrity of the host seem to be of equal importance in determining whetherinfection occurs.[10,12,4]

The control of wound infections has become more challenging due towidespread bacterial resistance to antibiotics and to a greater incidence ofinfections caused by microorganisms. The knowledge of the causative agents of automobile accident wound infection will be therefore helpful in the selection of empiric

antimicrobial therapy. Human skin acts as an excellent barrier to infection, provided it is not breached.

Infection of a wound is the successful invasion and proliferation by one or more species of microorganisms anywhere within the body's sterile tissues, sometimes resulting in pus formation.[11,17] Development of wound infection depends on the interplay of many factors. The breaking of the host protective layer, the skin, and thus disturbing the protective functions of the layer, will induce many cell types into the wound to initiate host response. Wound infections may occur following accidental trauma and injections, but post-operative wound infections in hospital are most common.[16]

Some infections are endogenous in which infection occurs from patient's own bacterial flora such as Staphylococcus aureus from skin and coli forms. For many infections exogenous skin and anterior nares are important sources of Staphylococci. Organisms commonly found in infected wounds include Gram positive cocci such as Staphylococcus aureus , Streptococcus, Gram negative bacilli mostly Acinetobacter, Enterobacter, E.coli, Proteus spp, Pseudomonas aeruginosa and anaerobic bacteria such as Propioni bacterium spp. and Klebsiella spp.[12]

Antibiotics are the greatest contribution of the present century to therapeutics and the emergence of prophylactic antibiotics has made a huge contribution towards extending the range and complexity of treatment. Truly, we live in the "antibiotic era" beginning with the early work of Sir Alexander Fleming in 1929, when penicillin became the first miracle drug. In the 1940's and 1950's experiments with sporadic prophylactic administration of antibiotics did not yield encouraging results until in the 1960's, when the importance of the timing of administration of dose emerged. After

which the use of prophylactic antibiotics exploded and now constitutes 30% of antibiotic use in general hospital.[13,14,18]

The current spread of bacterial pathogens has added a new dimension to the problem of wound infections. The management of wound infections has become more challenging due to the prevalent bacterial resistance to antibiotics.[15]

A greater incidence of infections found by antibioticssusceptibility test showed that most of the isolates are highly resistant to the antibiotic sensitivity. This is particularly worse in resource poor countries where sale of antibiotics is under poor control and not available to all people. A regular bacteriological review of infected wounds is therefore a necessity if affected patients must receive qualitative health care, particularly when blind treatment is a necessity, as in underdeveloped and developing nations.[16,17,14]

Therefore, this study aim at investigating the incidence of bacteriological profile and the antibiotic sensitivity pattern in oral andmaxillofacial injuries following RTA, in Best dental Science College and Government Rajaji Hospital ,Madurai, during the year of 2017. 100 patients who had history of RTA with soft tissue injuries were taken as samples. The objective was to study the prevalent bacteria in wound infection and their susceptibilities to commonly prescribed antibiotics.

AIM AND OBJECTIVES

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AIM

The aim of the study is to investigate the incidence of bacteriological profile and the antibiotic sensitivity pattern in oral maxillofacial injuries due to RTA.

OBJECTIVES

The objectives of the study are

1) To isolate and identify the microorganism from the wound.

2) To know the predominant organisms causing the infection.

3) To determine the antibiotic sensitivity pattern of the isolates.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

A. W. Bauer et al in 1966 concluded that the technique of antibiotic sensitivity should be used exactly as described, because although it has considerable flexibility, changes in conditions may combine to produce inaccuracies. Undiluted overnight broth cultures should never be used as an inoculam , but diluted at least 10 fold or preferably to a density equivalent to the Barium sulphate standard .The choice of antibiotics to be tested depends on a number of factors , such as the type of practice of the laboratory and the local preference for a particular agent[26].

Mark A Conover et al in 1985 presented this study to designed to test the efficacy of a prophylactic antibiotic regimen in preventing postoperative infection following major maxillary craniofacial procedures[28].

Itzhak brook et al in 1997 reported the microbiology of infection following trauma. A total of 368 specimens obtained from 340 trauma patients showed bacterial growth. The traumas included lacerations, blunt injury, penetrating injury, bites, and open fractures. Anaerobic bacteria only were isolated in 119 specimens, aerobic bacteria only in 58, and mixed aerobic-anaerobic flora in 191. The predominant anaerobic bacteria included Bacteroides fragilis group (119 isolates), Pepto streptococcuss (113), Clostridium specius (78), Prevotelias (58), and Fuso bacterium(23). The predominant aerobic bacteria included Escherichia coli(83), Staphylococcus aureus (61), Streptococcus pyogenes (27), Streptococcus group D (16), and Klebsiella pneumoniae (16). Staphylococcus aureus was isolated at all sites[25].

M. M. Abu-Serriah et al in 2000 did a study on the micro flora associated with extra oral endosseous craniofacial implants and found that Infection of soft tissues surrounding extra-oral craniofacial endosseous implants is a common clinical problem. The aim of this study was to analyze the micro flora associated with such implants, in both health and disease. Eighteen patients with a total of 49 implants were studied. Each patient was seen on two occasions for both a clinical examination and for collection of microbiological samples, using swabs and paper points, from the peri-abutment soft tissues.Specimens were cultured on blood agar and on agars selective for staphylococciand yeasts. Isolates were identified and selective antibiotic susceptibility testing undertaken. No single organism emerged as a predominant cause of peri- abutment skin infection but Staphylococcus aureus, Gram-negative bacilli and yeasts were all present as potential pathogens in this context [41].

Tarwo et al in 2002 conducted a study out of 532 wound swabs received from patients with wound infections and routinely processed by Gram staining and culture in the Microbiology Laboratory, is reported 444(83.5) of all samples cultured positive for bacterial pathogens while 88(16.5%) were bacteriologically sterile. 272 swabs yielded single Isolate while 172 yielded a mixture of two or more organisms. Staphylococcus aureus predominates (35.8%), followed by Pseudomonas spp (21.8%),Escherichia coli (15.3%), Klebsiella spp (13.4%), Proteus spp (5.6%),Coagulase Negative Staphylococci(3.1%), Streptococcus faecalis (2.8%),Streptococcs pyogenes (0.9%), Group Beta hemolytic Streptococci (0.9%),and Acineto bacteria spp (0.3%).Both Gram-positive and Gram-negative organisms

demonstrated moderate to high In vitro sensitivity to Ofloxacin and Ciprofloxacin (sensitivity rate 70-94%)[20].

In vitro sensitivity to Cloxacillin, Erythromycin, Azithromycin and Ceftazidime by Gram positive organisms ranged between 55 and 90% while Gentamicin, Ceftazidime and Azithromycin equally demonstrated moderate to high inhibitory effect on Gram negative organisms including Pseudomonas spp (sensitivity rate 55-90%). The Fluoroquino tones are the favoured antimicrobial agents now a days, as demonstrated in this study. In out, environment however, a combination of Cloxacillin and Gentamicin is an effective empirical alternative when cost is considered and this combination can be used. The need for continuous antimicrobial monitoring of clinical isolates of wound infection for drug resistance, which is of paramount importance in the empiric selection of antibiotics, is emphasized[20].

Shittu A.O et al in 2002 conducted the microbiological analysis of wound infection in 102 patients .The location and type of wound was considered and identification of bacterial isolates was determined by standard microbiological techniques. Forty per cent of wound types was attributed to trauma and in most cases, were located at the extremities. A total of one hundred and sixty two bacterial isolates were obtained from wound cultures. In 39 cases, cultures were mono microbial, 55cultures were poly microbial but no bacterial isolate was obtained in eight cases. Staphylococcus aureus was the predominant micro organism (25%) followed by Escherichia coli (12%), Pseudomonas aeruginosa (9%) and Staphylococcus epidermidis (9%). The diversity of microorganisms and the high incidence of poly microbic flora in this study give credence to the value of identifying one or more bacterial pathogens from wound cultures[39].

Richard H. Haug et al in 2003 The purpose of this article is to review the past and present oral and maxillofacial literature, with a focus on identifying any changes that may have occurred over the past decades in infections of the maxillofacial region. It attempts to answer whether there is any changes in the microbiology of maxillo facial infections and, if so, what those changes and patterns are like.[22]

SumieTakai, et al in 2005 proposed the study was to determine the incidence and bacteriology of bacteremia associated with various oral and maxillofacial surgical procedures. A total of 237 patients who underwent oral and maxillofacial surgery were included in this study. Blood samples were obtained for bacteriological examination immediately after the essential steps of the surgical procedure had been performed. With the results of bacteria was detected in patients who underwent surgery for tumor, infection and trauma, and surgical reconstruction of jaw. In particular, decortication for osteomyelitis and tooth extraction resulted in a higher incidence of bacteremia compared with other surgical procedures. The incidence of bacteremia was not affected by oral hygiene, gingival inflammation, blood loss, and duration of surgery. Furthermore, concerning tooth extraction, there was no statistical difference in the incidence of bacteremia with respect to the number of teeth extracted and the method of extraction. Extraction of teeth with odontogenic infection (periodontitis,periapical infection, and pericoronitis) did however produce a significantly increased incidence of bacteremia compared with infection-free teeth.Viridans streptococci were the predominant group of bacteria isolated from the bacteremias. Hence they concluded that Oral and Maxillofacial surgery involving

trans oral incision produces bacteremia, regardless of the extent and degree of surgical invasion. In particular, surgical procedure at infected sites is more likely to result in bacteremia compared with infection-free site[29].

Bhatt CP et al in 2005 did a study on the distribution of pathogens causing wound infection and their antibiotic susceptibility pattern, and a total of 200 pus specimens were cultured, of which 120-showed bacterial growth. Six different species of bacterial organisms and one fungus specie was isolated. The commonest isolate was Staphylococcus aureus followed by Escherichia coli, Pseudomonas aeruginosa, Streptococcus pyogenes, Klebsiella pneumoniae, Coagulase negative Staphylococcus species, and Proteus species.Staphylococcus aureus was found commonest organism of wound infection. In vitro antibiotic sensitivity test; Staphylococcus aureus were found to be equally sensitive to Ciprofloxacin, Ofloxacin, Cephalexin and Gentamicin; however the correct choice of antibiotics should be made only after the antibiotic susceptibility testing of the isolate[24].

Muhammed khan et al in 2006 discussed about the study to assess the role of the routine practice of microbial culture and sensitivity at incision and drainage of superficial soft tissue abscess. Out of 162 patients 115 yielded positive culture and the cultured micro flora was predictable and sensitive to empirical antibiotics[11].

David et al in 2006 elaborated the interventions to prevent and treat critical colonization infection and discuss the mechanism of action in management of wound infections[37].

Aizzazafar et al in 2007 conducted a study in a total of 100 culture positive samples from patients with mean age of 6.2±0.25 were analyzed. Patient history and clinical findings were collected on a pre-coded form. Pus samples or wound swabs were collected from infected wounds and were analyzed through culturing and biochemical methods for aerobic bacteria. A total of 109 bacteria were isolated from 100 samples with almost same frequency of Gram positive cocci 54 (49.54%) and Gram negative bacilli 55(50.45%). Most frequently isolated organism was S.aureus 45 (41.28%)followed by Pseudomonas species 20 (18.35%). Wound infection remains an ongoing problem which, although, cannot be completely eradicated, however by taking prompt control measures against the most commonly isolated organism and proper care of wound may lead to the minimum of wound infection[5].

Mathur et al in 2008 proposed the accidents and trauma are leading global cause of mortality in young adults. Infections are one of the most important causes of death in traumatized patients. This is because due to host and trauma itself. Trauma jeopardizes the host's tissue integrity and immune effect or mechanism. Severely traumatized patients admitted to the ICUs are prone to get nosocomial infections due to wound sand in dwelling . Finally diagnosis of infections in traumatized patients poses a challenge[1].

Abayomi et al in 2008 determined that the pattern of bacterial pathogens and their antibiotic sensitivity profile in patients with infected chronic leg ulceration. Sixty swab specimens obtained from chronic leg ulcer patients were cultured

aerobically and the antibiotic sensitivity pattern of the recovered organisms determined by the modified Kirby-Bauer disc diffusion method. The results are 47 (78.3%) of the ulcers were infected out of which 39 (83.0%) were culture positive. Most of the culture positive ulcers were on the distal third of the leg. The isolated bacteria from the wounds were Pseudomonas aeruginosa (33%), Staphylococcus aureus(24%), Proteus spp (15%), Klebsiella spp (13%), Citrobacter spp (13%)and Escherichia coli (2%). None of the patient without clinical evidence of wound infection had bacterial positive wound swab culture. All isolates were sensitive to third generation cephalosporin and floroquinolones but majority were resistant to ampicillin. Staphylococcus aureus.Klebsiella spp, are sensitive to third generation cephalosporin[35].

Nwachukwu et al in 2009 determined the prevalence of different pathogens in 45 surgical wounds, and their antimicrobial susceptibility patterns. Pus swab from each patient was collected aseptically, and inoculated on culture media. Isolates were characterized, and identified, and antibiotic susceptibility patterns were determined using the Kirby-Bauer diffusion method. Out of a total of 45 surgical wound specimens analyzed, Staphylococcus aureus was isolated from 33(42.30%), Pseudomonas eruginosa, Proteus mirabilis and Escherichia coli from 25(32.90%),10(12.80%), and 10(12.80%) respectively.

The antibiotic susceptibility of Staphylococcus aureus were Ciprofloxacin (60%), Erythromycin (40%),Gentamycin (60%), Streptomycin (60%). Resistance to Beta-lactam antibiotics was common among gram negative bacteria. Some isolates of

Pseudomonas aeruginosa were resistant to Gentamycin (18.70%) and Streptomycin (35.70%)[15].

Akinjogunla et al in 2009 evaluated the purulent materials which was collected aseptically with the aid of sterile swab sticks from forty patients with automobile accident wounds. These samples were examined microbiologically for the presence of aerobic bacteria and the susceptibility of these organisms to different conventional antibiotics was assessed using Kirby Bauer disc diffusion technique. A total of Seventy-four bacterial isolates were obtained from the wound cultures. A single etiological agent was identified in 13 (32.5%) samples while multiple agents were found in 26(65%), but no bacterial isolate was obtained in one case. Staphylococcus aureus was the predominant microorganism (37.8%) followed by Pseudomonas aeruginosa (27.0%), Escherichia coli (14.9%), Streptococcus pyogenes (12.2%) and Klebsiella pneumoniae (8.11%). Automobile accident wound infection was most prevalent in the age group of 21 - 40 and less prevalent in the age group 61 and above. Automobile accident infection was more prevalent (71.6%) in males than in females (28.4%).The results of the antibiotics susceptibility showed that most of the isolates were highly resistant to penicillin (80.4%), streptomycin (67%) and gentamycin (71.6%),and moderately sensitive to augmentin (46.2%), and nalidixic acid (56.8%),but highly sensitive to ofloxacin (81.6%), ciprofloxacin (75.8%) and pefloxacin (81%)[38].

Omar Abubaker et al in 2009 proposed in this study the wide use, misuse, and overuse of prophylactic antibiotics likely contributes significantly to overall health care cost. One of the areas of potential misuse of these agents is in the

prevention of infection of traumatic wounds. This review shows that despite the widespread use of prophylactic antibiotics to prevent infection of wound injuries, the scientific data to support such wide use are limited to specific situations and for limited period of time. These situations include those involving immune compromised patients, grossly contaminated wound, delayed wound closure, patients at high risk for endo carditiitis, patients with open fractures and joint wounds, and high velocity gunshot wounds. There may also be a benefit of such use for short duration when facial or oral lacerations are associated with compound fractures of the mandible and in through-and-through lacerations of the mouth in adults[27].

MunishKohli et al in 2009 conducted a study on In vitro evaluation of microbiological flora of oro facial infections and a total of 109 micro-organisms were isolated, no pathogenic organism were isolated in 3 cases. Out of 109 micro-organism isolated, 107 bacteria and 2 fungi were identified. Pure aerobes were identified in 28 (35%) of cases, pure anaerobes in 18(22.5%), mixed aerobes and anaerobes in 10(12.5%), mixed aerobes in 15(18.75%) and mixed anaerobes were isolated in 6(7.5%) cases. Among the entire pure gram positive isolates, ofloxacin was the most sensitive drug 83.33% followed by ciprofloxacin 76.2% and sparfloxacin 76.2%. The most resistant drugs were amoxicillin (92.85%) and ampicillin (92.85%). Cefotaxime was found sensitive in 75% of pure gram negative isolates[19].

P. G. BOWLER et al in 2009 did a study on Wound microbiology and associated approaches to wound management and concluded that dermal wounds involve exposed tissue, which, under normal circumstances would be sterile, i.e., free from microbial contamination. However, like normal intact skin, a newly formed

wound will naturally become colonized by microorganisms and compromised tissue will encourage their proliferation. In addition to the warm, moist, and nutritious conditions, ischemic wounds (usually chronic) are often characterized by tissue hypoxia ,necrosis, and an impaired immune response. From a practical perspective, controlling the microbial load in wounds is a vital factor in minimizing infection, and this can be achieved in several ways. Antimicrobial agents (antibiotics) are primarily used either prophylactically in the treatment of wounds that are likely to be heavily contaminated following surgery or therapeutically in the treatment of clinically infected wounds[10].

Yuvaraj et al in 2012 analyzed in this study included 88 patients who fulfilled the inclusion criteria. Pus was obtained by aspirating the involved spaces, culture and sensitivity tests were performed to determine the microbes involved and their sensitivity to various antibiotics. Upon isolating the various organisms causing infection, it was found that 68.2%were aerobes, 13.6% were mixed infections, and 9.1% were anaerobes. Streptococcus and Pepto strepto-coccus species were the most common among aerobes and anaerobes respectively. On determining sensitivity to penicillin, 81.3% were sensitive and 18.8% were resistant. Coagulase negative Staphylococcus and Staphylococcus aureus were predominantly resistant to penicillin[30].

Sani et al in 2012 conducted a study on antibiotic resistance profiles of bacteria from surgical wounds and were investigated in four General hospitals. Five hundred (500) samples of wound exudates from the general hospitals, were analyzed. The results showed the presence of Klebsiella Pneumoniae, Escherichia coli,

Pseudomonas aeruginosa, and Proteus vulgaris in the samples from the wounds. From the five hundred(500) samples collected from all locations, forty two (42) samples had Kl. pneumoniae, sixty four (64) samples had Ps. aeruginosa, fifty two (52)samples had P. vulgaris and one hundred and nine (109) samples had E. coli.E. coli was the most frequently isolated bacteria from wounds in all the locations, while Kl. pneumoniae was the least isolated from wounds in all the locations. All the bacteria were tested for sensitivity against tarivid,pefloxacin, ciprofloxacin, Augmentin, gentamycin, streptomycin, ceporex,nalidixic acid, septrin, ampicillin, ampiclox, zi-nacef, amoxicillin, rocephin,erythromycin. Most of all the isolates were sensitive to ciprofloxacin, andTarivid while others were resistant to remaining antibiotics. coli, Strept. pyogenes and S. aureus showed highest resistance profile and P. vulgaris, Kl. pneumoniae and Ps. aeruginosa showed least resistance profile to most antibiotics use[14].

Mohammed et al in 2012 conducted in this retrospective study of incidence of wound infections and antibiotic sensitivity pattern in patients which involves the analysis of the medical records of 651 patients. The medical records of the patients with wound infections showed that 77.9% of the wound sites were contaminated with various bacteria isolates notably Staphylococcus Aureus, followed with Klebsiella spp in decreasing order of frequency. The most common infection site was surgical sites .Amoxicillin, gentamicin and ceftriaxone, being the most commonly prescribed antibiotics for the treatment of resulting infections based on the culture and sensitivity results[3].

BiswajitBatabayal et al in 2012 conducted a study on objective prevalence of Staphylococcus aureus and Methicillin-Resistant Staphylococcus aureus (MRSA) in surgical site infections (SSIs) . This study was conducted on 66 patients who underwent surgery in the department of Oral &Maxillofacial Surgery. Pus samples were collected with two sterile swabs and processed in the Microbiology department. Result of the 66 pus samples, the most common organism which was isolated was Staphylococcus aureus, with 34(51.5%) isolates. Of these, 14 (41.2%) were Methicillin Resistant Staphylococcus aureus (MRSA). All MRSA isolates showed multiple drug resistance (MDR), except linezolid. Indian clinicians and infectious disease specialists are facing formidable challenges from Methicillin Resistant Staphylococcus aureus[40].

Biswajit Batabayal et al in 2012conducted a study the impenum of Staphylococcus aureus isolated from post-operative oral and maxillofacial infections. To investigate the present status of antimicrobial resistance against impenum was carried out by disc diffusion test (Kirbybauer test)[36].

Poonam verma et al in 2012 indicated the microbiological analysis of infection in 245 patients, Identification of bacterial isolates was determined by standard microbiological techniques. A total of one hundred and sixteen bacterial isolates were obtained from different cultures. In 86cases, cultures were mono microbial, 16 cultures were poly microbial but no bacterial isolate was obtained in 149 cases.

Staphylococcus aureus was the predominant microorganism (40%) followed by Klebsiella sp. (33%), Pseudomonas sp. (18%), Escherichia coli (16%), and Proteus

sp. (7%). The diversity of microorganisms and the high incidence of poly microbic flora in this study give credence to the value of identifying one or more bacterial pathogens from pus cultures[31].

Thomas Ray et al in 2012 performed to determine the etiology of skin and soft-tissue infections (SSTI) in a general population, and to describe patient characteristics, frequency of microbiologic testing, and the role of methicillin-resistant Staphylococcus aureus (MRSA) over time[4].

Vishal Garg et al in 2012 reported the commonest age group prone to maxillofacial injury was between 16-30 years. Male preponderance was quiet evident (6:1). The commonest cause of such injuries was road traffic accident including 83.1% of the total cases. Soft tissue was the most common type of maxillofacial trauma (52.3%). Most common bones involved were nasal bone and mandible (18.5% each) and the commonest associated injury was involvement of limbs (30.0%). Most common weapon involved was blunt (90.8%). Drawing public attention and awareness towards the traffic rules especially use of helmets by the motorcyclists and separation of pedestrians from motor vehicles could possibly reduce the number of maxillofacial trauma case[7].

Santosh et al in 2013 confirms that the micro flora of odontogenic infections consists of complex mixture of aerobic and anaerobic bacteria. The microorganisms isolated were Streptococcus; Klebsiella. Amoxicillin clavulanic acid and cefotaxime were most effective antibiotics[33].

Girma Godebo et al in 2013 concluded in their study of Multidrug-resistant bacterial isolates in infected wounds at Jimma University Specialized Hospital, Ethiopia that the overall rate of MDR bacterial pathogens that caused wound infection was very high and many of the isolates were also identified as resistant to three or more classes of antimicrobials. Such widespread resistance to antimicrobial classes is something serious because a few treatment options remain for patients with wound infections. In this study, multidrug-resistant (MDR) status of gram positive and gram negative bacteria was tested against 10 and 7 classes of antimicrobials respectively. Accordingly, the overall rate of MDR among gram positive isolates was 77%. This means, 86.2% of S.aureus and 28.6% of Coagulase negative Staphylococci (CNS) were becoming MDR. Moreover, 30.1% of S.aureus showed resistance to six antimicrobial classes.[34]

Vishwajith et al in 2014 discussed the aerobic bacteriological spectrum and antibiotic susceptibility pattern of isolates of orthopedic infections. Out of 98 samples, 72 (73.46%) yielded pure growth, 21 (21.42%) mixed growth, 5 (5.1%) showed no growth. Out of 115 bacterial strains isolated 56 (48.69%) were Staphylococci and 59 (51.3%) were Gram negative bacilli. Among the Staphylococcus spp, Methicillin resistant staphylococcus aureus, (50%), Methicillin sensitive staphylococcus aureus(33.9%), Methicillin resistant coagulase negative (9%) and Methicillin resistant coagulase negative staphylococci (7.1%). Susceptibility pattern of Methicillin resistant staphylococcus aureus isolates were 68% to cotrimaxozole, 43% to clindamycin, 29% to erythromycin, 18% to gentamycin and all

Methicillin sensitive staphylococcus aureus strains were sensitive to Vancomycin and Linezolid.

Among Gram negative bacilli, Pseudomonas (25.4%), Escherichia coli (22%), Enterobacter (22%),Klebsiella (15.3%), Citrobacter (8.4%), Acinetobacter (3.3%) and Proteus(3.3%). Pseudomonas strain s showed 100%. Sensitivity to imipenem 87% to piperacillin-tazobactum, 73% to amikacin, 66% to cefotaxime, 47% toCiprofloxacin, 27% to gentamycin. Knowing the prevalence and the antibiotic susceptibility pattern of the isolates, helps us to guide the clinician to select the most appropriate antibiotics thereby prevent in indiscriminate use of antibiotics[8].

Albinjose et al in 2014 aimed to screen the bacterial pathogens present in surgical or non surgical wound pus and to determine their antibiotic sensitivity and resistance pattern against 12 frequently used commercial antibiotics[17].

Samir farmahan et al in 2014did a study to investigate whether the microbiological picture and antibiotic sensitivity of infections in the head and neck has changed in the last 30-40 years. Retrospectively studied 150patients admitted for inpatient treatment of infections in the head and neck ,most infections originated from the teeth and skin, and the submandibular (69%) and buccal (67%) spaces were involved most often. Multiple spaces were involved in 94 patients. Swabs were taken for culture and sensitivity in102 cases, and microorganisms were isolated in 91 (89%), of which 67 (74%)were aerobic infections and 24 (26%) were anaerobic. Bacteria were isolated in 87 (96%) cultures of which 60 (69%) were Gram-positive. Gram-positive cocci were isolated in 62% of cultures. The most common bacteria isolated were streptococci. 70% of the bacteria were sensitive to amoxicillin and 84%to

amoxicillin and metronidazole; 14% (Staphylococcus aureus from infections of the skin) were resistant to penicillin[32].

Kilian Kreutzer et al in 2014 found that the fear of SSIs is the motivation for the use of antibiotics in non infected sites in clean or clean-contaminated surroundings. Evidence exists for the beneficial use of antibiotics in tympanostomy, orthognathic surgery, and operative tooth extractions. However, because of their adverse side effects, no recommendations are made for the use of antibiotics in the last-mentioned procedure[13].

Rashi Bahl et al in2014 odontogenic infections were mixed aerobic–anaerobic infections. Anaerobic as well as aerobic cultures were necessary to isolate all pathogens. Successful management of these infections depends on changing the environment through decompression, removal of the etiologic factor and by choosing the proper antibiotic[12] .

Tongen Roel et al in 2014 did a study on susceptibility pattern of aerobic bacterial isolates from wound swab and concluded that ,the total of 496 strains were isolated out of which 232 (46.77%) were Gram negative bacilli and 264(53.23%) were Gram-positive cocci. Out of the 466 culture positive samples, 29 samples showed poly microbial growth. E coli was the most common pathogen isolated. Of the 156 isolates of Staphylococcus aureus 68 was from ward and 88 from Out Patient Department (OPD) of which 31(45.58%) and 30(34.09%) were determined to be methicillin resistant (MRSA) respectively. Out of 95 isolates of Coagulase Negative Staphylococcus(CoNS), 56 was from ward and 39 from OPD.

Methicillin Resistant Staphylococcus (MRCoNS) prevalence rate was 46 (82.14%) and 28(71.79%) forward and OPD respectively. The gram negative isolates were most sensitive to imipenem and it was least sensitive to cephalosporin groups of antibiotics[9].

Vikrant negi et al in 2015 did a study in rural setting of Utharakhand state in India for the bacteriological profile of surgical site infections and their antibiogram . Out of 786 patients, 137 (17.8 %) were found to have surgical site infections and samples were collected. Out of total 137 samples 132 (96.4%)yielded bacterial growth and 139 bacterial isolates were obtained .Staphylococcus aureus (50.4%) was the commonest organism followed by Escherichia coli (23.02%) , Pseudomonas aeruginosa (7.9%) and Citrobacter species (7.9%) . Antimicrobial profile of gram positive isolates revealed maximum sensitivity to vancomycin teicoplanin and linezolid, whereas gram negative isolates meropenem, piperacillintazobactam , and amikacin were found to be most sensitive[21].

Mythri B.A in 2016 did a study on aerobic bacteriological profile from wound the infections in road traffic accidents patients .This study showed that Staphylococcus aureus and Pseudomonas were the commonest organisms associated with the RTA wound site. A high rate of MRSA, MBL and ESBL producers were observed which imply treatment failure with empirical antibiotics. Hence the antibiotic susceptibility pattern of the isolated organisms should be obtained at the earliest to avoid unwarranted prolonged empirical therapy and to administer appropriate and effective treatment[2].

Deepa nedumaran in 2016 conducted a study on bacterial isolates and their antimicrobial susceptibility pattern in patients with compound fracture wounds and concluded that Staphylococcus aureus (26.06 percent) was the predominant pathogen from open fracture wound infection followed by Staphylococcus epidermidis (21.8 percent) and Proteus mirabilis

Out of total 137 samples 132 (96.4%) yielded bacterial growth and 139 bacterial isolates were obtained .Staphylococcus aureus (50.4%) was the commonest organism followed by Escherichia coli (23.02%) , Pseudomonas aeruginosa (7.9%) and Citrobacter species (7.9%) . Antimicrobial profile of gram positive isolates revealed maximum sensitivity to vancomycin and linezolid, whereas gram negative isolates meropenem , piperacillin tazobactam , and amikacin were found to be most sensitive. (14.39 percent). Out of 49 S. aureus and41 S.epidermidis isolates 22 (44.8 percent) and 19 (46.34 percent) were detected as Methicillin resistant respectively. Out of 98 GNB isolated, 62 (63.3percent) showed ESBL resistant pattern. The GPC isolated were 100 percent sensitive to Vancomycin and 83.05 percent sensitive to Amikacin. The GNB isolates were sensitive to Imipenem (100 percent), Cefoperazone-sulbactum(83.33percent), Ciprofloxacin (77.33 percent) and Gentamicin (71 percent)[16].

Kanwal preet Kaur, et al in 2017 did a study on Bacteriological profile of surgical site infections and found out that rate of SSI was 58.00%. A total of 431

isolates were obtained, out of which 428 (99.30%) were bacterial isolates and 3 (0.69%) were fungal isolates. Mon microbial growth was seen in 395 (95.64%) patients whereas poly microbial growth was seen in 18 patients (4.35%). Out of 428 bacterial isolates, majority of bacteria were gram negative bacteria (60.74%) but most common isolate was Staphylococcus aureus.

The microbiological profile of the 260 (60.74%) gram negative bacteria was Klebsiella pneumoniae followed by Pseudomonas aeruginosa Escherichia coli, Acinetobacter spp., Citrobacter spp. and Proteus spp. Methicillin resistance was seen in 10.52% of all the S.aureus isolates and 21.05% of CONS isolates. No vancomycin resistance in enterococcus was detected. Out of 260 gram negative bacilli, 105 (40.38%) were ESBL producers[23].

M. H. Bhalchandra et al in 2018 , conducted a study on aerobic bacterial profile of The bacterial isolates were identified by standard bacteriological techniques. Isolated organisms were further tested for antibiotic sensitivity, Out of 303 samples, 202 (66.66%) were culture positive in which 140 (69.31%) samples were mono microbial and 62 (30.69%) samples were poly microbial.

Thus total 271 isolates were obtained from 202 culture positive samples. Of the total 271 isolates, 160 (59.04%) were gram negative ans 111 (40.96%) were gram positive organism. The most common isolates was S.aureus (37.63%) followed by Pseudomonas spp.(20.33%) and E.Coli (19.56%), In pathological and post-operative wound infections S.aureus was the most common i.e.44.62% and 34.09% respectively. Whereas pseudo monas species was most common in trauma wound infections. Isolated strains of S. aureus were 78% sensitive to Amikacin and 73%

sensitive to Linezoid. E.coli, Klebsiella sppandproteus spp were 81%, 57% and 91%sensitive toAmikacin respectively. Pseudomonas spp were 96% sensitive to imipenem and 56% sensitive to Amikacin. Isolated most of the strains of gram positive and gram negative organisms were sensitive to Amikacin, whereas there was no single common antibiotic to which all isolated gram positive and gram negative bacteria were 100% sensitive[18].

Pilli Hema Prakash Kumari et al in 2018 concluded that Isolation and detection of culture isolates was done by using standard bacteriological techniques and antibiotic susceptibility testing was performed by disc diffusion method by following CLSI guidelines on Muller-Hinton (MH) agar. Highest number of pus samples were from incision and drainage (23.8%) followed by chronic non-healing ulcer (19.04%). Twenty one different bacterial isolates were obtained from one hundred pus samples. S. aureus was the predominant bacteria (28.5%) followed by coagulase-negative Staphylococci (23.8%). The results of the antibiotics susceptibility testing illustrated that majority of the isolated organisms were MDR[6].

MATERIALS & METHODS

MATERIALS AND METHODS

The present study on Oral Maxillofacial injury wound infections in RTA was carried out in the Department of Oral and Maxillofacial Surgery, Best Dental Science College and Rajaji Medical College Madurai, over a period of one year (January 2017 to December 2017). A total of 100 clinical cases of oral maxillofacial injury in department of Oral and Maxillofacial Surgery of Best Dental science College and Rajaji Government College Madurai, were taken for the study.

Inclusion Criteria

- Specimens were collected from clinical cases of maxillofacial injuries following RTA with intra oral and extra oral lacerations.

Exclusion Criteria

- Cases of space infections and odontogenic infections isolates were excluded from the study.

METHODS

A. SPECIMEN COLLECTION

The tissue sample was collected with aseptic precautions using sterile cotton swabs. The wound margins were separated with the thumb and forefinger of one hand (wearing a sterile glove) and swabs were taken from the depth of the wound with the other hand. Two swabs were taken, placed in a sterile container and taken to the laboratory

ARMAMENTARIUM

Mac Conkey's Agar Plate

Bacteriological-Incubator

B. PROCESSING OF SPECIMENS

The samples were processed immediately in the following manner.

1. Direct smear study:

Direct smears were made from the first swab and stained with Gram stain. The smear was screened for bacteria. The Gram reaction, morphology, arrangement and number of types of the organisms were noted.

2. Culture.

The second swab was immediately inoculated on 5% Sheep blood agar and Mac Conkey's agar and incubated aerobically at 37^{o} C for 18-48 hrs. The blood agar was incubated in a 5-10% CO_2 atmosphere.

3. Identification tests.

Isolated colonies from the plates were identified for colony morphology, Gram stain, oxidase test, catalase test and motility. For further identification isolated colony was inoculated into peptone water, which was incubated aerobically and inoculated into appropriate medias for biochemical tests like indole production, methyl red, Voges-Proskauer test, citrate utilization test, urease test, sugar fermentation, Triple sugar iron agar test, nitrate reduction test and amino acids decarboxylase tests. The specific tests like slide and tube coagulase test was used to identify *Staphylococcus aureus*. Bile aesculin agar was used to identify *Enterococcus species*.Phenylalanine deaminase test was used to identify *Proteus species*.

DETECTION OF BACTERIUM

Primary plates were observed for any visible growth after 24 hours and if there was no growth within 24 hours, subcultures were made from nutrient broth on to the same solid media. All types of colonies on the primary plates were examined macroscopically using a magnifying lens, and the colony characteristics were recorded. Smear was made from isolated colonies, stained by Gram staining and were observed under oil immersion subjective for the size, shape, Gram reaction, arrangement, presence or absence of specific structures like granules which would help in preliminary identification.

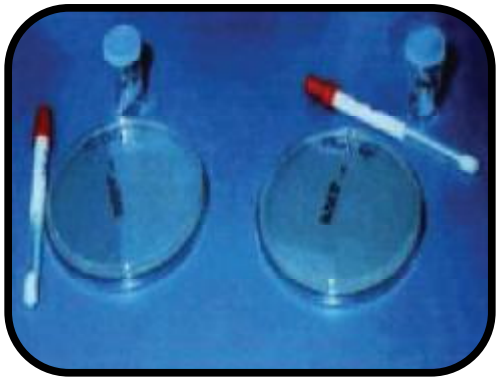
i) MacConkey Agar

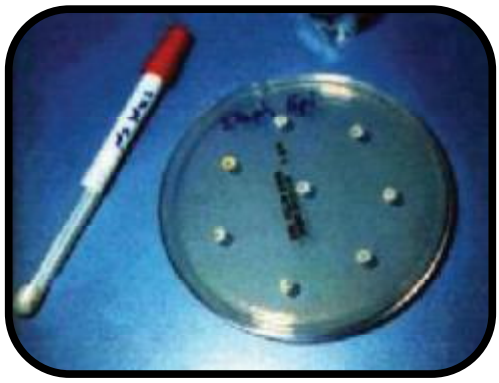
After 24 to 48 hours of incubation, the colony characteristics like size, form, elevation, margins, colour, surface, density and consistency were noted along with colour to detect Lactose utilizing properties of the organism. Lactose fermenting bacteria produced colonies that were in varying shades of pink, often mucoid and non-lactose fermenting bacteria appeared colourless or transparent. On Gram staining, often Gram negative bacilli and sometimes pleomorphic and cocco-bacillary forms were seen.

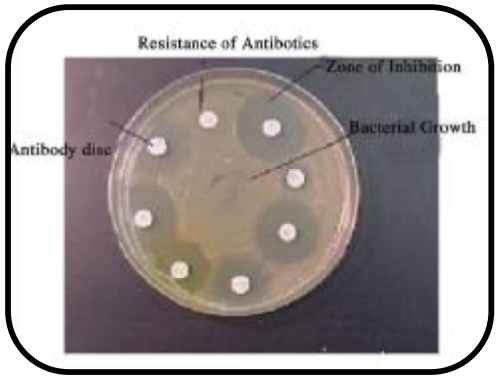
ii**) Blood Agar**

After 24 hours of incubation, the colony characteristics like size, form, elevation, margins, colour, surface density and consistency were observed. The plates were examined to detect hemolytic reactions in the agar. Convex, 2-3 mm creamy yellowish to white colonies with entire edges, often beta hemolytic were seen. On

Gram staining, Gram positive cocci arranged in clusters, pairs, tetrads, chains etc were seen.

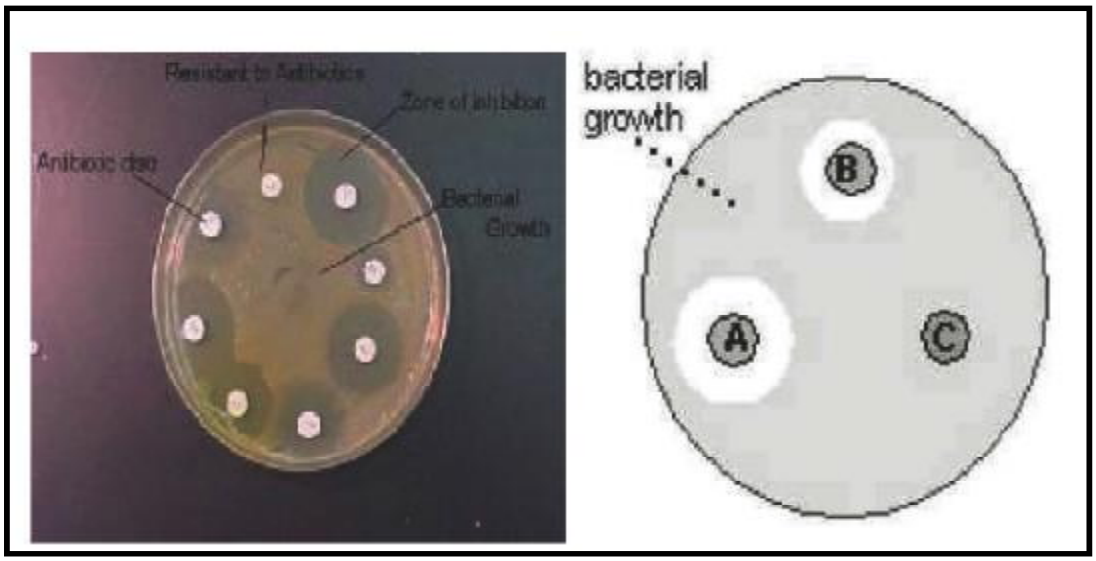






KIRBY-BAUER TEST FOR ANTIBIOTIC SUSCEPTIBILITY

A true antibiotic is an antimicrobial chemical produced by microorganisms against other microorganisms. Bacteria respond in different ways to antibiotics and chemosynthetic drugs, even within the same species. For example, Staphylococcus aureus is a common normal flora bacterium found in the body. If one isolated this bacterium from 5 different people, the 5 isolates would likely be different strains, that is, slight genetically different. It is also likely that if antibiotic sensitivity tests were run on these isolates, the results would vary against the different antibiotic used.



The Kirby-Bauer test for antibiotic susceptibility, called the disc diffusion test, is a standard that has been used for years. First developed in the 1950s, it was refined and by W. Kirby and A. Bauer, then standardized by the World Health Organization in 1961. It has been superseded in clinical labs by automated tests. This test is used to determine the resistance or sensitivity of aerobes or facultative anaerobes to specific

chemicals, which can then be used by the clinician for the treatment of patients with bacterial infections. The presence or absence of an inhibitory area around the disc identifies the bacterial sensitivity to the drug. The bacterium is swabbed on the agar and the antibiotic discs are placed on top. The antibiotic diffuses from the disc into the agar in decreasing amounts the further it is away from the disc. If the organism is killed or inhibited by the concentration of the antibiotic, there will be NO growth in the immediate area around the disc: This is called the zone of inhibition. The zone sizes are looked up on a standardized chart to give a result of sensitive, resistant or intermediate. Many charts have a corresponding column that also gives the MIC (minimal inhibitory concentration) for that drug. The MIC is currently the standard test run for antibiotic sensitivity testing because it produces more pertinent information on minimal dosages. The Mueller-Hinton medium being used for the Kirby-Bauer test is very high in protein.

Blood Agar Showing golden yellow colonies of Staphylococcus. Aureus

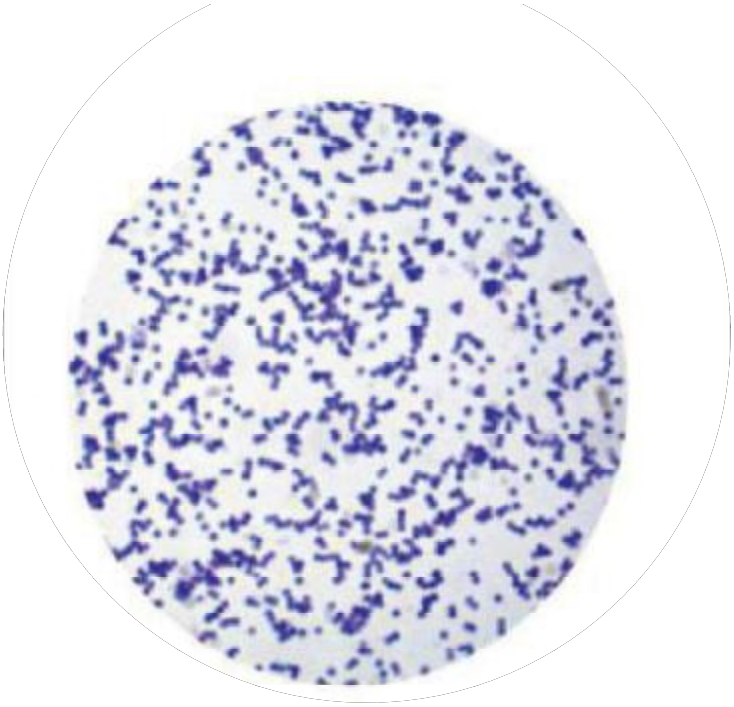
Blood Agar showing Beta haemolytic colonies of staphylococcus. aureus

MacConkey agar showing pink mucoid colonies of Klebsiella pneumoniae

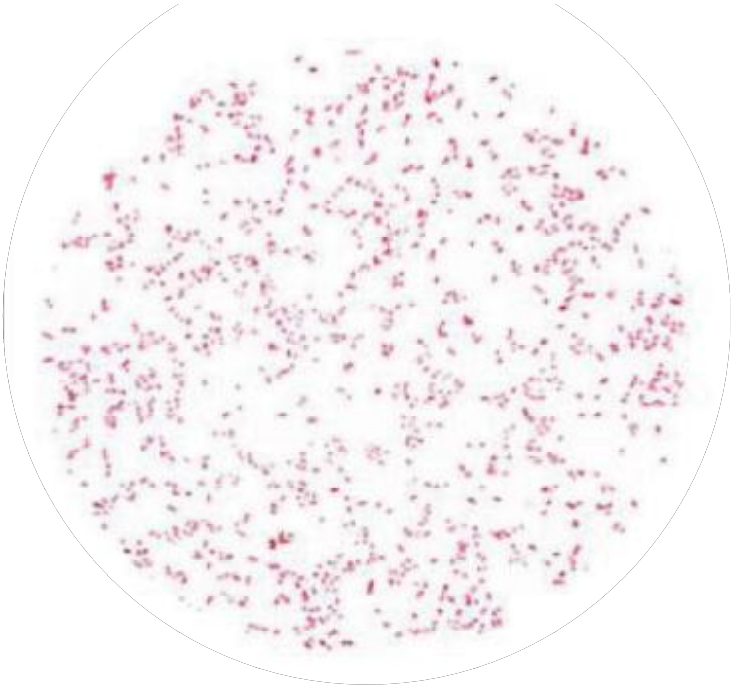
Blood agar showing grey mucoid colonies of

Kiebsiella pneumoniae

Gram's stain showing Gram positive cocci in clusters



Gram's stain showing Gram negative bacilli



RESULTS AND STATISTICAL ANALYSIS

RESULTS

In the present study 100 clinical cases of oral maxillofacial injuries in Road Traffic Accident of all ages and both sexes were studied over a period of one year from January 2017 to December 2017.

Statistical Analysis:

The analyzed results were expressed as percentages for the description of the distribution of Oral maxillofacial injury wound infection cases according to age, sex, organisms etc.

AGE AND SEX DISTRIBUTION OF PATIENTS

Table No.1-Age and Sex distribution of patients with Oral maxillofacial injuries

SI.No	Age group in years	Male	Female	Total
1.	0-10	1	0	1
2.	11-20	8	5	13
3.	21-30	24	6	30
4.	31-40	14	7	21
5.	41-50	7	4	11
6.	51-60	10	2	12
7.	61 and above	9	3	12
	Total	73	27	100

Out of 100 clinical cases of oral maxillofacial injuries, 73 (73%) were, males and 27 (27%) were female with a male to female ratio of 3:1 Maximum number of oral maxillofacial injury patients was in the age group of 21-30 years.

Graph No.1 Graphic representation of Age and Sex distribution of patients

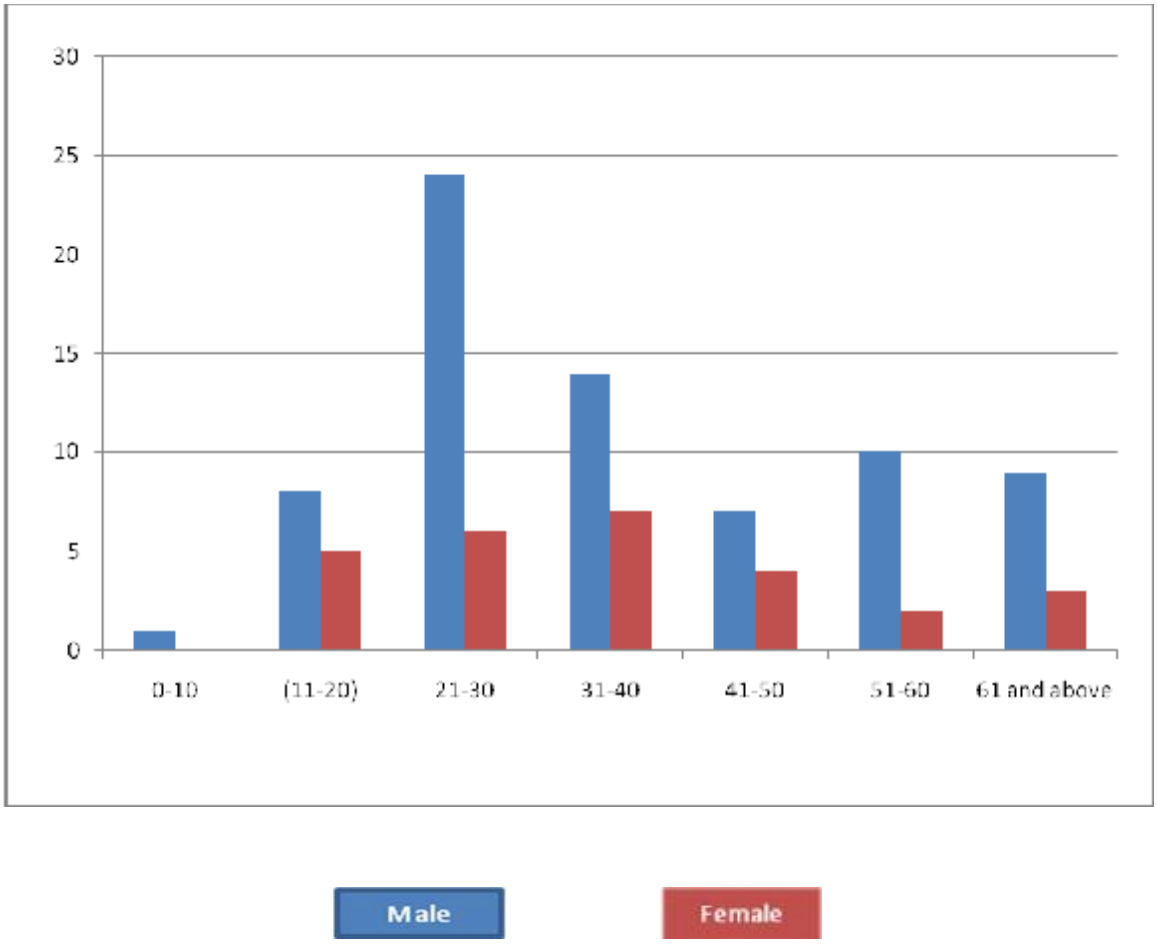


Table No.2-Distribution of cases according to laceration types

SI.No	Laceration Types	No of cases	Percentage
1	Extra Oral laceration	57	57%
2	Intra Oral laceration	43	43%
Total Cases		100	100

of the 100 clinical cases of oral and maxillofacial injuries, 57 (57%) were extra oral lacerations and 43 (43%) were intra oral lacerations.

Graph No.2 Graphic representation of cases according to lacerations types

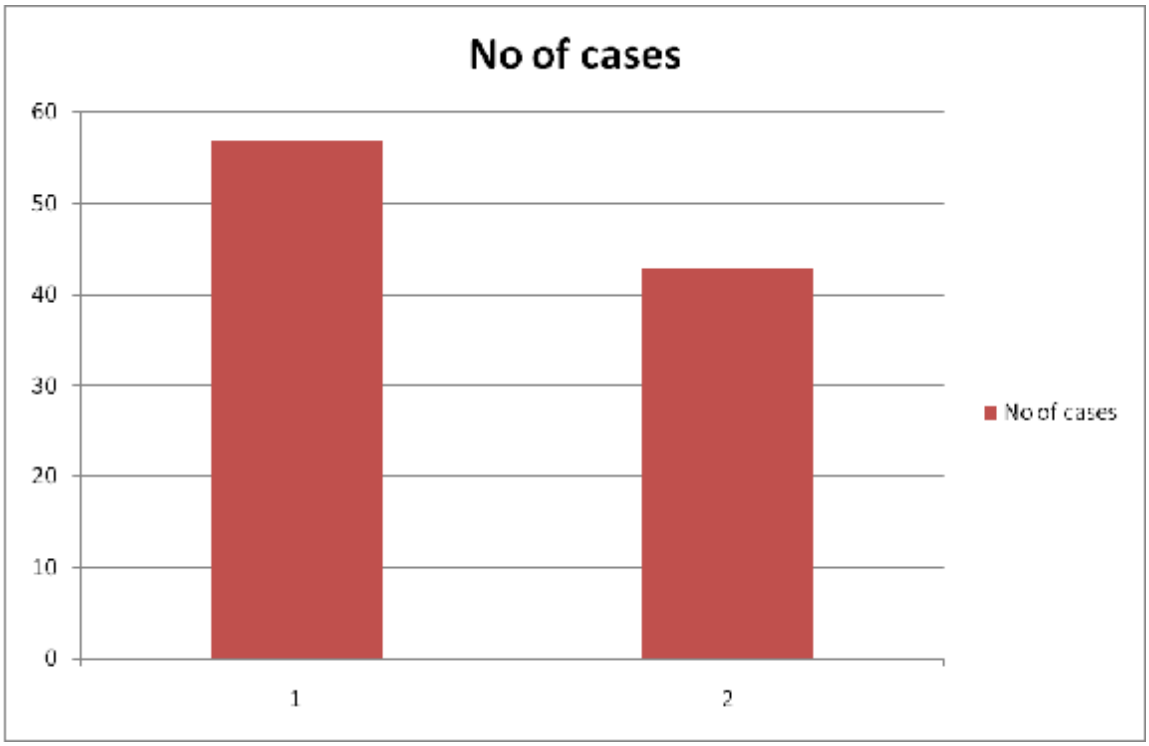


Table No.3- Distribution of cases according to injury

SI.No	INJURIES	NO CASES
1.	Soft Tissue Injury	57
2.	Zygomatic Complex Fracture	18
3.	Panfacial Trauma	2
4.	Dento Alveolar Fracture	3
5.	Mandible Fracture	14
6.	Lefort Fracture	4
7.	Nasal Bone Fracture	2
	Total	**100**

Graph No. 3: Distribution of Cases According to Injury

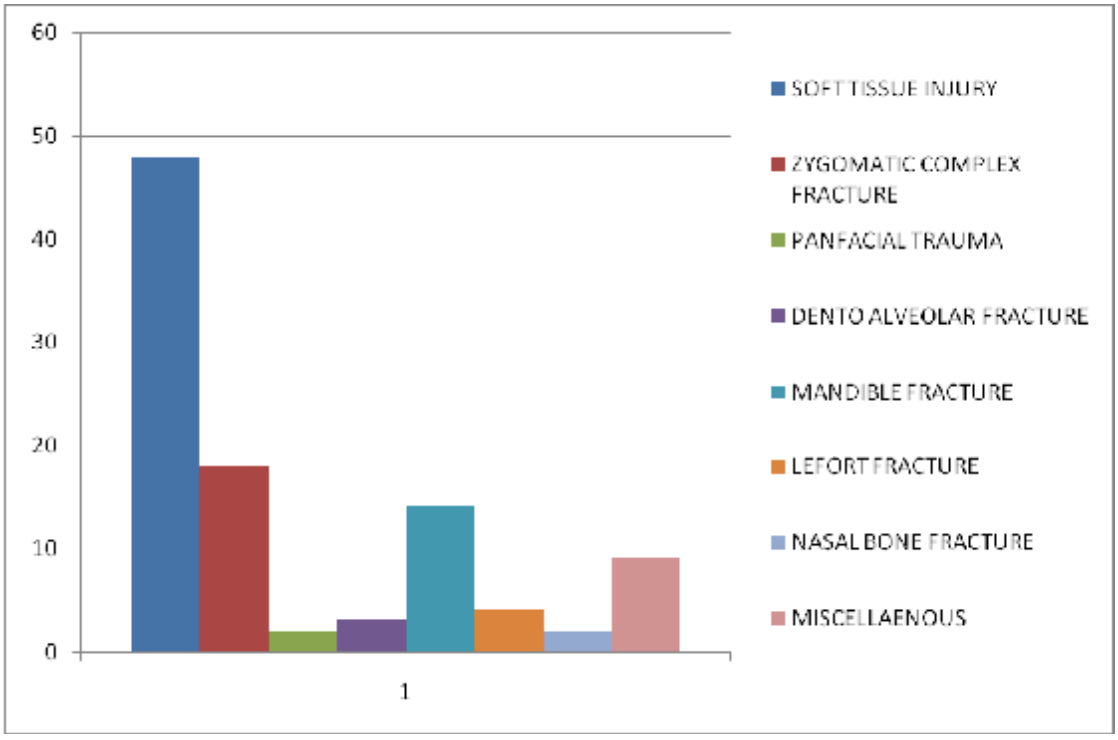


Table -4 Distributions of culture positive cases according to Number of organisms

SI.NO	Number of Organism		%
1	Single Organism	73	73%
2	Mixed Organisms	27	27%

In this study, out of 100 culture samples, 73 (73%) samples yielded a single organism on culture and 27 (27%) samples yielded 2 organisms (mixed)

Graph No 4 : Graphic representation of distribution of culture positive cases according to number of organisms

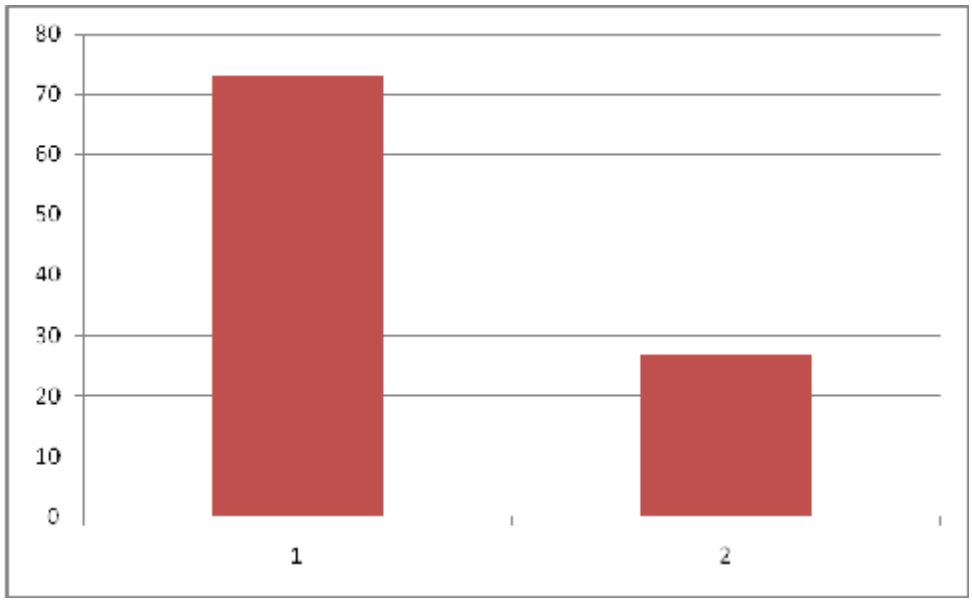


Table No 5 :- Distribution of culture positive cases according to spectrum Bacterial Isolates

SI.No	Organisms	Total No	Percentage
1	*Staphylococcus aureus*	63	63%
2	*Klebsiella pneumoniae*	37	37%
Total			**100**

Graph No : 5 Graphic representation of distribution of culture positive cases according to spectrum of bacterial isolates

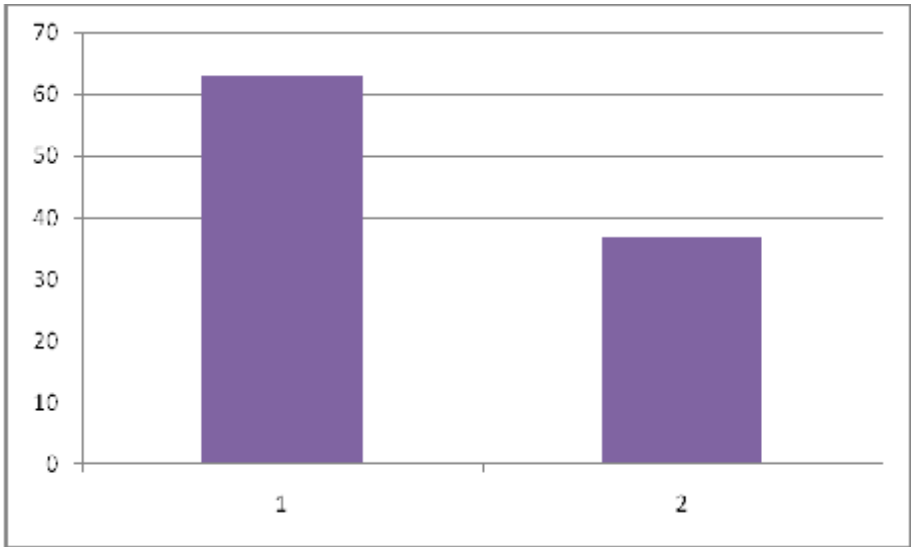
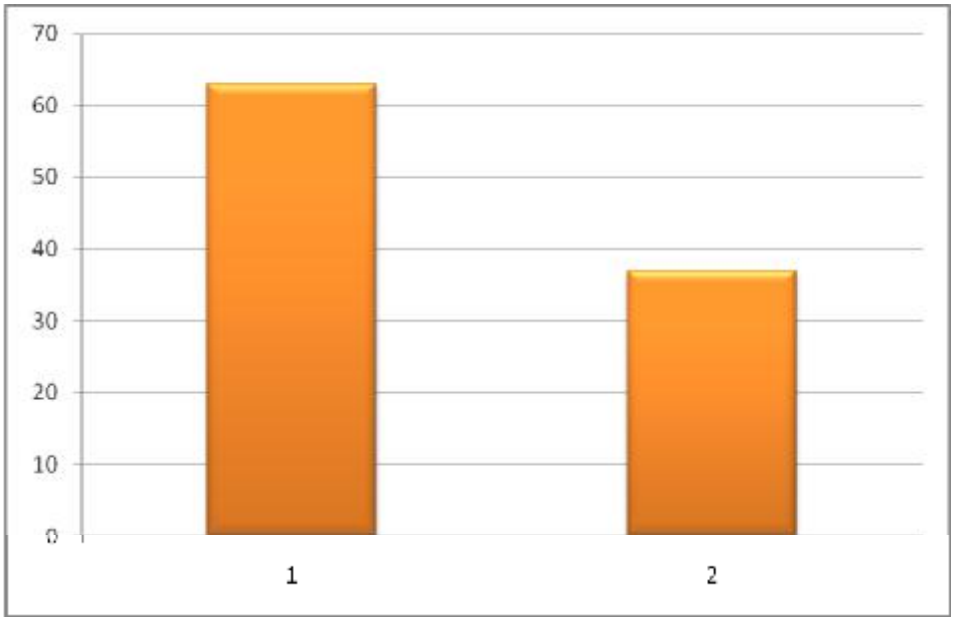


Table No 6 :- Distribution of cases according to culture growth

SI.No	Culture of Growth	No of cases	Percentage
1	Gram Positive	63	63%
2	Gram Negative	37	37%
Total			**100**

Out of the 100 clinical cases of oral and maxillofacial injuries, 63 (63%) samples were culture positive gram growth and 37 (37%) were culture gram negative growth.

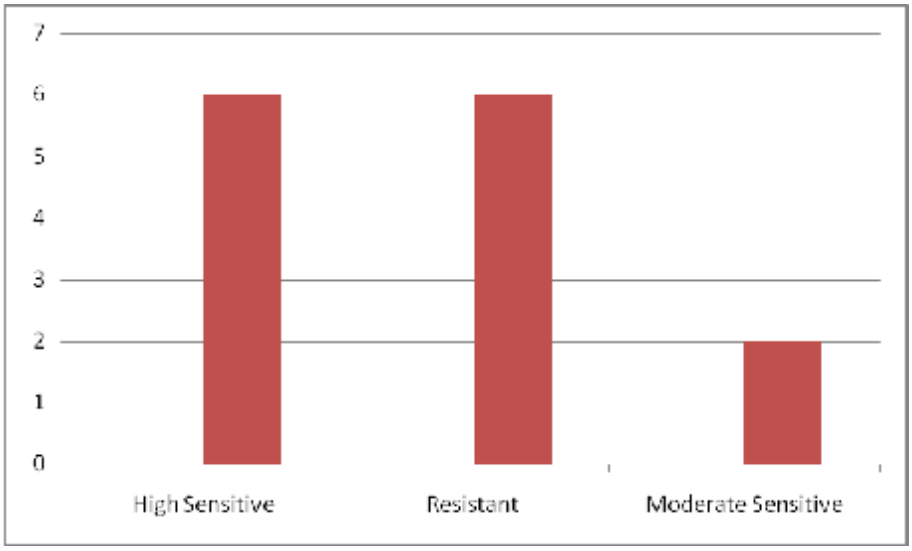
Graph No. 6 : Distribution of Cases According to culture Growth



ANTIBIOGRAM PATTERN OF GRAM POSITIVE ISOLATES

Out of 63 Gram positive 63 were *Staphylococcus aureus* and moderate sensitive to Co-trimoxzole and cefazolin 2. Highsensitive to Azhithromycin, Piperacilline, Cefuroxime, Cephalexin, Amoxicillinclavlanic acid, Ofloxacin 6 Resistant to Tetracycline, Amoxicillin, Erythromycin, Ciprofloxacin, Chloramphenicaol, Pencillin 6.

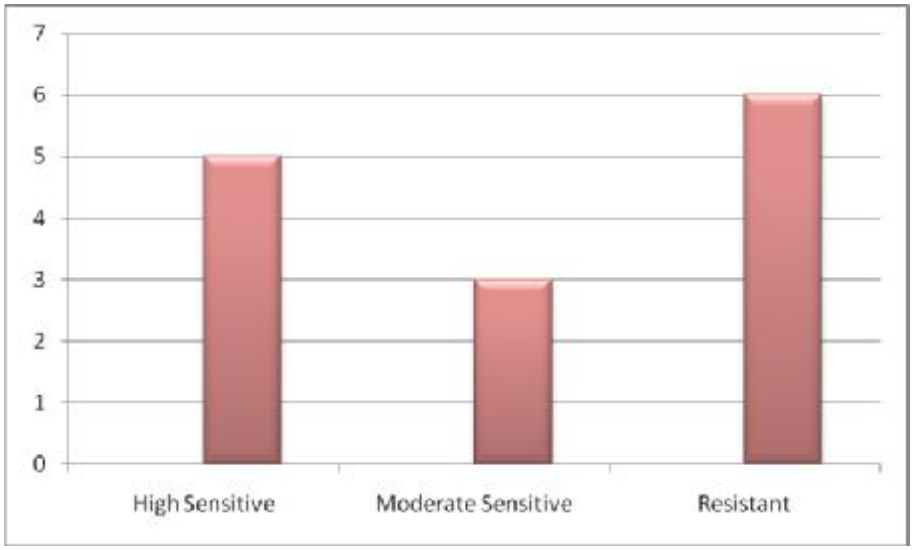
Graph No. 7 Graphic representation of distribution of according antibiogram pattern of gram positive isolates



ANTIBIOGRAM PATTERN OF GRAM NEGATIVE ISOLATES

Out Of 37 *Klebsiella pneumoniae* isolates, all the 37 were sensitive to high sensitive to amikacin, ofloxacin, cefuroxime, cefixime, cefotaxime 5 . moderate sensitive to norfloxacin, nitrofurantion, ceftaximide 3. All the strains were resistant to Nalidixic Acid, axtreonam , ceftriaxone, gentamicin, ciprofloxacin, cefdinir 6.

Graph No.8 Graphic representation of distribution of according antibiogram pattern of gram negative isolates



DISCUSSION

DISCUSSION

Throughout the world, the growth of the transport system has been and continues to be a key element in economic development. An increase ingross national product is accompanied by a greater movement of people and goods and greater investment in both vehicles and transport infrastructure. In the developing world, current trends in population growth, industrialization and urbanization are putting heavy pressure on the transport network in general and on road system in particular. Some of the unwanted side-effects of this growth in traffic, such congestion and noise are immediately obvious to the individual citizen. Others, such as the growing number of deaths and injuries from road traffic accidents (RTAs), are apparent only through aggregated statistics. These reveal a serious and growing problem, with absolute fatality and casualty figures rising rapidly in the majority of developing countries and with death rates considerably higher than in the developed world.[19,10,4]

Each year RTAs claim some 6,00,000 lives and thirty times this number, that is over fifteen million, are injured according to the World Health Organization. This represents more than one life lost every minute and an injury every two seconds. Two third of these victims are from the third world countries according to Nilambar jha 2003.[1,4]

Maxillofacial injury occurs in approximately five to thirty percent of patients experiencing trauma. It can occur as an isolated injury or in combination with other severe injuries. There is considerable literature available on the epidemiology of major trauma globally. The present study was done on the patients is the management

of wound infection is a complex and important aspect of wound care. The value of Microbiology in prevention and treatment of wound infection cannot be overemphasized, as proactive measures are made possible with knowledge of the prevailing organisms and their antibiogram sensitivity has been compared with ***Akinjoguniai***[4,5].

Assesment of facial injuries

Patterns of lacerations are associated with Inherent biomechanical and Structural properties of the skin and properties of the skin. The skin overlying the maxilla and zygoma absorb less force on impact because bone underneath it fractures and depresses into skull. It depends upon location, size and depth of soft tissue involvement.[37,10] All lacerations that were countiguous in skin interruption within a specified area of the face are counted as a single laceration. The average length of laceration is determined by averaging the length of the single lacerations within a designated area. The blood vessels and perivascular fibrous connective tissue including collagen bundles parallel the cleavage ones of face at various levels of which minimizes injury to the underlying microvasculature. Frontal bone and mandible are able to withstand to a greater degree than maxilla and zygoma.[20,4] Types of injuries are contusion is a bruising injury caused by blunt trauma with or without haematoma. Abrasion is superficial injury to skin or mucous membrane from scraping or friction. Laceration is the commonest form of facial injury where tissues are torn by blunt, sharp instrument or by pressure and likely to be infected. Puncture wounds are injuries deeper structure, sometimes resulting in arterio venous fistulas. Accidental tattoos are small dermis embedded particles, which gets fixed in an

abrasion. If not removed within 12 hrs after injury, it cannot be removed after 24 hrs. Puncture wounds commonly implant lead pencils, paint chips, rust particles and wood splints. Avulsion injuries are produced due to the shearing forces between a fixed structure (bone) and a mobile structure (soft tissue) leading to degloving of the overlying soft tissue from the underlying bone. In most of the cases this leads to loss vascularity of the degloved skin and soft tissues and will need resurfacement procedures. Retained foreign bodies such as glass, ornament metal, wood splinters, dental fragments, bullets, missile fragments if not removed migrate to different areas leading to severe cellulitis and subsequent abscess formation.[10,19,22]

Wound infection is the most common complication of wound healing. Frequently, wound infection is no more than a minor disability but it is a disability of substantial economic significance. Infected patients are unproductive and occupy hospital beds and they utilize valuable medical and nursing resources. In some cases, infection has more serious consequences for the patient; it may result in life threatening hemorrhage and loss of limb or even death due to sepsis in severe cases. Infection is a constant threat in all types of surgery and it is essential that surgeons understand the nature of the problem, they must be familiar with the factors which cause wound infections, they must constantly attempt to prevent infection, and they must understand how to treat infected wounds. Bacterial infection is the most common complication of wound healing and it encountered in every surgical specialty. Multiple factors are involved in the pathogenesis of wound infection and the effects of infection are divers.[21,24]

The effect of bacterial infection on wound healing and the biochemistry of wound infection is complex. Delayed epithelial growth and migration, cellular necrosis and micro vascular thrombosis are histological features of infected wounds and they result from the combined effect of bacterial toxins and the hostile chemical environment of the infected wound. The principle of biochemical abnormality in infected wound seems to be a disturbance of collagen metabolism, there is a constant process of synthesis and lysis of collagen in all wounds and to a lesser extent in unwounded tissue and this process may be affected in several ways by the presence of bacterial infection. Firstly, there is exaggerated lysis of wound collagen by collagenolytic enzymes, some of these are lysosomal enzymes present in polymorphonuclear lymphocytes in the infected wounds, others are enzymes which are normally present in tissues. The second factor, which may affect collagen metabolism, is disturbance of collagen synthesis in infected wound. Fibroblasts engaged in synthesis of wounds collagen must complete with other cells for available nutrients within the wound and in the presence of infection the metabolism of bacteria and inflammatory cells may utilize oxygen and other wound nutrients to the extent that the metabolism of fibroblasts is impaired. The net result of the changes in collagen metabolism is that the collagen content of the wound is reduced, the process is not confined to the wound alone, it extends through the wound edges into unwounded tissues, the wound edges becomes soft and mechanically weak, and wound sutures will cut out the softened tissue resulting in the disruption of wounds closed by primary suture.[22,26,28]

Etiology of wound infection is not by single factor is responsible for wound infection. Several factors are involved and the relative contribution of these factors

varies greatly in different types of micro organisms. The vast majority of wound infections are endogenous. They are self-infections resulting from contamination of wound by bacteria carried by the host either on the body surface or more commonly within hollow viscera. A smaller proportion of wound infections are exogenous.[30,6]

Wound infections are usually caused by bacteria and it can be classified according to staining characteristic with Gram stain (positive or negative), shape (cocci, rods, spirals) and sensitivity to Oxygen (aerobic, facultative, anaerobic) or according to the combination of these characters. Gram positive cocci Staphylococci and some streptococci species are the Gram positive cocci of interest to surgeons because of their ability to cause primary surgical infections and post operative infections. Staphylococci may be coagulase positive or coagulase negative. Staphylococcus aureus is the most common pathogen isolated from wound infections. A major factor in its pathogenicity is coagulase production, although the mechanism by which coagulase production increases virulence is not known.[29,32] Most coagulase positive staphylococci should be resistant to penicillin and require treatment by a penicillinase resistant antibiotic. Extensive use of penicillinase resistant beta-lactam antibiotics during past 2 decades has encouraged emergence of Methicillin resistant staphylococcus aureus (MRSA). Coagulase negative staphylococci are the most common organisms recovered innosocomial bacteremia and are frequently associated with clinicallysignificant infections of intravascular devices.[23,33]

Aerobic and facultative anaerobic gram negative bacilli rods that can cause human disease have been identified. The genera Escherhia, Klebsiella, Proteus, Enterobacter, frequently can be cultured from patients with intra abdominal and pelvic peritonitis and abscess, post operative wound infection, pneumonia and urinary tract

infection. Pseudomonas aeurginosia is the species responsible for most surgical infections. They are frequently found in immunologically compromised patients, especially if they have been hospitalized for some time. Because of its resistance to single antibiotic therapy, Pseudomonas infections are frequently treated with combination of two antibiotics.[24,2,6]

Anaerobic bacteria require reduced oxygen for growth. Virtually all anaerobic infections arise endogenously. The cell wall of anaerobic bacteria is important in abscess formation. The genus Clostridium is most virulent of all anaerobes. Systemic factors which may affect wound healing are age, malnutrition, vitamin deficiency, Zinc deficiency, Trauma, hypovolaemia and hypoxia, anaemia, uraemia, Malignant disease, Jaundice, corticosteroid drugs, cytotoxic and antimetabolite drugs.[25,31,34]

Role of laboratory in infection diagnosis and a variety of laboratory tests may be helpful in determining the timing of therapeutic intervention in patients with proven or suspected infection. The basic procedures usually include a naked eye examination of the specimen, microscopic examination of Gram stain, and culture on aerobic and anaerobic blood agar plates, on MacConkey's agar and in cooked meat broth. Generally wound infections are characterized by leukocytosis.. Laboratory helps in defining laws of infection in isolating a specific organism or a group of organism and providing data that supports the worthiness of antimicrobial treatment in terms of insuring both the killing of organism and minimum toxicity from the dry closure. Gram stain is a simple procedure which pathogenic agents can be predicted and can guide as for empirical therapy.[26,10]

According to ***Akinjogunia*** the wound swab from the local site of suspected infection should be cultured and should be sent along. The specimen should be inoculated on to two plates of blood agar, one for incubation in 370C aerobically, preferably in air plus 5-l0%, Co2, the other for incubation anaerobically in nitrogen / hydrogen pulse 5-10% Co2. The agar plate also has antibiotic walls to identify sensitivity. The culture plates are examined after overnight incubations at 37o C for 18-24 hours. If no growth, plate should be reincubated for another 24 hours 50. Most infectious can be managed well by using standard disc diffusion antibiotic susceptibility data (***Kirby-bauer disc diffusion antibiotic susceptibility technique***) and providing dosage of standard amount of antibiotics as required.[4,38]

The use of antimicrobials or antibiotics in wound infections has come in a long way in prophylactic therapeutic management. The role of antimicrobial therapy is to prevent or treat infections by reducing or eliminating pathogenic organism until the host's own defenses can get rid of the last pathogen. The basic consideration in choosing antimicrobial is efficacy, toxicity and cost effectiveness. Effective antimicrobial agent must be active against the pathogens causing the infections and must be able to reach the site of infections in adequate concentration and in particular time. All antibiotics have potential toxicity.Toxic effects may be idiosyncratic such as allergy or the rare instance of bone marrow aplasia caused by chloramphenicol or result in damage to tissue and organs as renal toxicity or ototoxicity seen with aminoglycosides and amphotericin B.[31,34,36]

Antimicrobial agents also exert selective pressure on the microbial ecology of hospital that leads to resistant microbes lost in the final consideration in the selection of antimicrobials.

Principles of Antibiotic Therapy

1. The organism should be sensitive to antibiotic chosen.
2. Antibiotics should be in dose that ensures adequate peak concentration and tissue penetration.
3. The Antibiotics should come in contact with the organism.
4. Frequency of administrative is based on the half life and the route of eliminations of the antibiotics
5. Choose a bactericidal antibiotic when appropriate.
6. Use synergistic therapy when appropriate
7. Avoid antagonistic combination of antibiotics
8. Choose the most appropriate and narrow spectrum antibiotic
9. Adverse effects should be evaluated and risk benefit balanced.
10. Ensure proper duration of therapy to ensure eradication of pathogenic organism discussed by ***AOmar abubaker***.[27,12]

Mohammed conducted in this retrospective study of incidences of wound infections and antibiotic sensitivity pattern in patients which involves the analysis of the medical records of 651 patients. The medical records of the patients with wound infections showed that 77.9% of the wound sites were contaminated with various bacteria isolates notably ***Staphylococcus aureus***, followed with Klebsiella spp in decreasing order of frequency. The most common infection site was surgical sites

with amoxicillin, gentamicin and ceftriaxone, being the most commonly prescribed antibiotics for the treatment of resulting infections based on the culture and sensitivity results.[27,12]

Akinjogunla evaluvated the purulent materials were collected aseptically with the aid of sterile swab sticks from forty patients with automobile accident wounds. These samples were examined microbiologically for the presence of aerobic bacteria and the susceptibility of these organisms to different conventional antibiotics was assessed using ***Kirby Bauer disc diffusion technique***. A total of Seventy-four bacterial isolates were obtained from the wound cultures. A single etiological agent was identified in 13 (32.5%) samples while multiple agents were found in 26(65%). ***Staphylococcus aureus*** was the predominant microorganism (37.8%) and ***Klebsiella pneumoniae*** (8.11%). Automobile accident wound infection was most prevalent in the age group of 21 - 40 and less prevalent in the age group 61 and above. Automobile accident infection was more prevalent (71.6%) in males than in females (28.4%).The results of the antibiotics susceptibility showed that most of the isolates were highly resistant to penicillin (80.4%), streptomycin (67%) and gentamycin (71.6%), and moderately sensitive to augmentin (46.2%), and nalidixic acid (56.8%), but highly sensitive to ofloxacin (81.6%), ciprofloxacin (75.8%) and pefloxacin (81%). The findings of this study showed that ofloxacin, ciprofloxacin and pefloxacin may be drugs of choice for the treatment of automobile accidentwound infection.[38,4,35]

Shittu A.O conducted the microbiological analysis of wound infection in 102 patients was undertaken. The location and type of wound was considered and identification of bacterial isolates was determined by standard microbiological techniques. Forty per cent of wound types was attributed to trauma and in most cases,

were located at the extremities. A total of one hundred and sixty two bacterial isolates were obtained from wound cultures. In 39 cases, cultures were monomicrobial, 55 cultures were polymicrobial but no bacterial isolate was obtained in eight cases. Staphylococcus aureus was the predominant microorganism (25%) followed by Escherichia coli (12%), Pseudomonas aeruginosa (9%) and Staphylococcus epidermidis (9%). The diversity of microorganisms and the high incidence of polymicrobic flora in this study give credence to the value of identifying one or more bacterial pathogens from wound cultures.[39,29]

Biswajat conducted a study With the Objective prevalence of Staphylococcus aureus and Methicillin-Resistant Staphylococcus aureus (MRSA) in surgical site infections (SSIs). This study was conducted on 66 patients who underwent surgery in the department of Oral & Maxillofacial Surgery. Pus samples were collected with two sterile swabs and processed in the Microbiology department. Result of the 66 pus samples, the most common organism which was isolated was Staphylococcus aureus, with 34(51.5%) isolates. Of these, 14 (41.2%) were Methicillin Resistant Staphylococcus aureus (MRSA).[40,15,26]

M. M. Abu-Serriah conducted a study on the Infection of soft tissues surrounding extra oral craniofacial endosseous implants is a common clinical problem. The aim of this study was to analyse the microflora associated with such implants, in both health and disease. Eighteen patients with a total of 49 implants were studied. Each patient was seen on two occasions for both a clinical examination and for collection of microbiological samples, using swabs and paper points, from the periabutment soft tissues. Specimens were cultured on blood agar and on agars Selective for staphylococci and yeasts. Isolates were identified and selective

antibiotic susceptibility testing undertaken. No single organism emerged as a predominant cause of peri-abutment skin infection but *Staphylococcus aureus.* Culture and sensitivity results should therefore guide the treatment of these infections.[41,34]

These studies reveal the prevalent bacteria in wound infection and their susceptibilities to antibiotics the incidence of bacteriological profile and the antibiotic sensitivity pattern. In our study the statistical analysis shows that 100 isolates altogether 63 isolates were of Gram positive bacteria, accounting for 63%. And Gram negative bacteria accounted for 37 (37%) isolates. 100 samples yielded growth on culture and Out of culture samples 63 (63%) samples yielded a single organism and 7 (7%) samples yielded 2 organisms.

The most frequent isolate was *Staphylococcus aureus*, which represented 63 (63%), followed by *Klebsiella pneumoniae* 37(37%) of the total isolates. ***Staphylococcus aureus*** was found to be the most common Gram positive organism isolated and ***Klebsiella pneumonia*** was the most common Gram negative organism isolated. The Gram positive organisms were most *Highsensitive* to azithromycin, piperacilline, cefuroxime, cephalexin, amoxicillin clavlanicacid, ofloxacin. The Gram negative organisms were most sensitive to *Highsensitive* to amikacin, ofloxacin, cefuroxime, cefixime, cefotaxime. ***Staphylococcus aureus*** (63%) was the most common organism isolated from Oral and maxillofacial injury infections in RTA from this study.

It was also found that ***Klebsiella pneumonia(37%)*** was the most common Gram negative organism that was isolated from this study.

SUMMARY

SUMMARY

- The present study on oral and maxillofacial injury infections in RTA was carried out in the Division of Oral Maxillofacial Surgery, Best Dental Science College and Hospital, Madurai, Rajaji Govt.Medical College Madurai, over a period of one year (Jan 2017 to Dec 2017)
- Clinical cases of oral and maxillofacial injuries of all age groups and both sexes, irrespective of the bacteriological profile and antibiotic sensitivity pattern were included in this study.
- Samples yielded growth on culture and Out of 100 culture samples 73 (73%) samples yielded a single organism and 27 (27%) samples yielded 2 organisms.
- 63 isolates were of Gram positive bacteria, accounting for 63% and Gram negative bacteria accounted for 37 (37%) isolates.
- The most frequent isolate was Staphylococcus aureus, which represented 63 (63%), followed by Klebsiella pneumoniae 37(37%) of the total isolates.
- Staphylococcus aureus was found to be the most common Gram positive organism isolated and Klebsiella pneumonia was the most common Gram negative organism isolated.
- The Gram positive organisms were most High sensitive to azithromycin, piperacilline.

cefuroxime, cephalexin, amoxicillin clavlanic acid, ofloxacin.

- The Gram negative organisms were most sensitive to amikacin, ofloxacin, cefuroxime, cefixime, cefotaxime.

CONCLUSION

CONCLUSION

The present study which was conducted in Division of Oral Maxillofacial Surgery in Best Dental Science College has given us the knowledge of the most common bacterial organisms causing wound infection in RTA and their antibiotic sensitivity pattern in oral and maxillofacial injuries.

In our study the most common causative agent of oral maxillofacial injuries in RTA was *Staphylococcus aureus* followed by *Klebsiella pneumoniae.* The Gram positive organisms were most *highly sensitive* to azithromycin, piperacilline, cefuroxime, cephalexin, amoxicillin clavlanicacid and ofloxacin. The Gram negative organisms were most sensitive to amikacin, ofloxacin, cefuroxime, cefixime, cefotaxime.

Microorganisms responsible for oral maxillofacial injuries infections in RTA like *Klebsiella pneumoniae* have the ability to produce extended spectrum.The most frequent isolate was *Staphylococcus aureus,* which represented 63 (63%) or the total isolates, followed by *Klebsiella pneumoniae* 37 (37%), *Staphylococcus aureus* was found to be the most common Gram positive organism isolated and *Klebsiella pneumoniae* was the most common Gram negative organism isolated.

Staphylococcus aureus (63%), was the most common organism isolated from Oral and maxillofacial injury infection.

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ANNEXURE

INSTITUTIONAL ETHICAL COMMITTEE

Best Dental Science College and Hospital

Ultra Nagar, Madurai - 625 104.

RECOGNIZED BY DENTAL COUNCIL OF INDIA, NEW DELHI
AFFLIATED TO THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY, CHENNAI)

IRB/IEC Reference No: 2016-STU-BrIII-AJP-19

Project title : To evaluate bacteriological profile and Antibiotic sensitivity pattern in Oral and Maxillofacial injuries following RTA

Principal Investigator: Dr. Ani John Peter, PG student

Review: New/Revised/Expedited

Date of Review: 27/09/2016

Date of previous review, if revised application:

Decision of the IEC/IRB:

- Provisional approval to conduct the study is being given
- The results of this study, along with summary are to be submitted for obtaining final approval

Recommended time period: one year (28-09-17)

PRINCIPAL
BEST DENTAL SCIENCE COLLEGE
MADURAI-625104

ETHICS COMMITTEE SIGN DATE BDSC

INSTITUTIONAL REVIEW BOARD SIGN DATE BDSC

Signature of Member Secretary

NB:

- **Inform IRB/IEC immediately in case of any issue(s)/adverse events**
- **Inform IRB/IEC in case of any change of study procedure, site and investigator**
- **This permission is only for the period mentioned above**
- **Annual report to be submitted to IEC/IRB**
- **Members of IEC/IRB have right to monitor the trail with prior intimation**

KEY TO CHART

1. PG - PENICILLIN
2. AX - AMOXICILLIN
3. AC - AMOXICILLIN CLAVULANIC ACID
4. CT - CO TRIMOXZOLE
5. CP - CEPHALEXIN
6. CR CEFUROXIME
7. CF - CEFAZOLIN
8. ER - ERYTHROMYCIN
9. CK - CHLORAMPHENICOL
10. CL - CIPROFLOXACIN
11. PC - PIPERACILLIN
12. AZ - AZITHROMYCIN
13. TE TETRACYCLINE
14. NF - NORFLOXACIN
15. AT - AZTREONAM
16. CX - CEFOTAXIME
17. FR - CEFTRIAXONE
18. NA - NALIDIXIC ACID
19. FU - NITROFURANTION
20. GM - GENTAMYCIN
21. AK - AMIKACIN
22. CZ CEFTAXIMIDE
23. FX CEFIXIME
24. CN CEFDINIR
25. R RESISTANT
26. MS MODERATE SENSITIVE
27. HS HIGH SENSITIVE

GRAM POSITIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	PG	AX	AC	CT	CP	CR	CF	ER	CK	CL	OF	PC	AZ	TE
1.	25/01/17	Vijay	45/M	Zygomatic fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
2.	25/01/17	Narasimma	51/m	Soft Tissue Injury	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
3.	20/01/17	Kannan	19/m	Lefocte fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
4.	22/02/17	Manimekali	33/f	Mandible fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
5.	09/02/17	Rabeeh	19/m	Mandibular fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
6.	7/02/17	Rajaram	42/M	Mandibular fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
7.	05/02/17	Kumaran	22/m	Zygomatic fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
8.	15/03/17	Pakari	37/f	Zygomatic fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R

GRAM POSITIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	PG	AX	AC	CT	CP	CR	CF	ER	CK	CL	OF	PC	AZ	TE
33.	26/07/17	Alagumalai	30/m	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
34.	19/07/17	Tejas raja	43/M	Nasal bone fracture	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
35.	23/08/17	Pasumalai	63/M	Soft tissue injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
36.	18/08/17	Sivalingam	27/M	Soft tissue injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
37.	9/08/17	Karuppan	64/M	Zygomatic fracture	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
38.	26/08/17	Karthi	27/M	Nasal bone fracture	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
39.	18/08/17	Gowind	13/m	Zygomatic fracture	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
40.	03/08/17	Srinath	54/m	Zygomatic fracture	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**

GRAM POSITIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	PG	AX	AC	CT	CP	CR	CF	ER	CK	CL	OF	PC	AZ	TE
41.	18/08/17	Pavayi	27/f	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R
42.	10/08/17	Vijaya	40/f	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R
43.	17/08/17	Surya Kala	46/f	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R
44.	18/08/17	Aruna	14/f	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R
45.	19/08/17	Bava	26/m	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R
46.	20/08/17	Kavi	23/m	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R
47.	03/08/17	Kumari	68/f	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R
48.	26/08/17	Karthi	26/08/17	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	R

GRAM POSITIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	PG	AX	AC	CT	CP	CR	CF	ER	CK	CL	OF	PC	AZ	TE
49.	15/09/17	Pandidurai	29/m	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
50.	11/09/17	Pandiyammal	39/f	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
51.	13/09/17	Kathayi	61/F	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
52.	09/09/17	Manikandan	57/m	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
53.	21/09/17	Periyampillai	41/m	Leforte fracture	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
54.	10/09/17	Muthu	24/m	Soft Tissue Injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
55.	7/09/17	Baskarani	29/m	Soft tissue injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**
56.	08/09/17	Kavina	24/f	Soft tissue injury	Staphylococcus aureus	**R**	**R**	**HS**	**MS**	**HS**	**HS**	**MS**	**R**	**R**	**R**	**HS**	**HS**	**HS**	**R**

GRAM POSITIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	PG	AX	AC	CT	CP	CR	CF	ER	CK	CL	OF	PC	AZ	TE
57.	15/09/17	Mohanan	57/M	Soft tissue injury	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
58.	08/09/17	Naseer	55/M	Soft tissue injury	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
59.	11/10/17	Kaveen	46/m	Soft Tissue Injury	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
60.	17/10/17	Poongodi	49/f	Soft tissue injury	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
61.	25/10/17	Palnivel	26/M	Zygomatic fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
62.	25/10/17	Kathayi	67/F	Pan facial fracture	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R
63.	21/11/17	Thejus	52/m	Soft Tissue Injury	Staphylococcus aureus	R	R	HS	MS	HS	HS	MS	R	R	R	HS	HS	HS	R

GRAM NEGATIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	NF	AT	CX	FR	NA	FU	CR	GM	AK	CL	OF	CZ	FX	CN
1.	30/01/17	Surya	19/M	Soft tissue injury	Klebsella pnumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
2.	22/02/17	Selvaraj	41/m	Zygomatic fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
3.	25/02/17	Sasi	19/m	Mandibular fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
4.	10/03/17	Ganeshkumar	58/m	Zygomatic fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
5.	05/03/17	Sreeram	23/m	Zygomatic fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
6.	22/03/17	Soloyammal	29/f	Mandibular fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
7.	06/04/17	Kowsalya	48/f	Zygomatic fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
8.	26/04/17	Priya	24/f	Panfacial fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R

GRAM NEGATIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	NF	AT	CX	FR	NA	FU	CR	GM	AK	CL	OF	CZ	FX	CN
9.	02/04/17	Jayaraj	13/m	Soft Tissue Injury	Klebsellap neumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
10.	02/04/17	Badhsa	21/m	Soft Tissue Injury	Klebsellap neumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
11.	18/05/17	Raja	40/m	Zygomatic fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
12.	02/05/17	Payi	70/F	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
13.	0706/17	Radha	35/f	Mandible fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
14.	08/07/17	Ubaid	26/m	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
15.	06/07/17	Prasanth	23/m	Mandible fracture	Klebsellapneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
16.	09/07/17	Tamilsevi	20/f	Mandible fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R

GRAM NEGATIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	NF	AT	CX	FR	NA	FU	CR	GM	AK	CL	OF	CZ	FX	CN
17.	19/07/17	Poomalai	35/M	Soft tissue injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
18.	03/07/17	PeriyaSamy	39/m	Leforte fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
19.	19/08/17	Hakeem	17/m	Soft tissue injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
20.	17/08/17	AmalRaj	35/m	Zygomatic fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
21.	13/08/17	Ajay	76/m	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
22.	09/08/17	Karuva	47/f	Mandible fracture	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
23.	03/08/17	Supriya	28/f	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
24.	19/08/17	Hakeem	17/m	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R

GRAM NEGATIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	NF	AT	CX	FR	NA	FU	CR	GM	AK	CL	OF	CZ	FX	CN
25.	17/08/17	AmalRaj	35/m	Zygomatic fracture	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**
26.	13/08/17	Ajay	76/m	Soft Tissue Injury	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**
27.	09/08/17	Karuva	47/f	Mandible fracture	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**
28.	03/08/17	Supriya	28/f	Soft Tissue Injury	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**
29.	19/08/17	Hakeem	17/m	Soft Tissue Injury	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**
30.	23/08/17	Umrnayel	26/m	Soft Tissue Injury	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**
31.	10/08/17	Sathish	25/m	Leforte fracture	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**
32.	07/09/17	Sulthamrnohammd	27/m	Soft Tissue Injury	Klebsella pneumoniae	**MS**	**R**	**HS**	**R**	**R**	**MS**	**HS**	**R**	**HS**	**R**	**HS**	**MS**	**HS**	**R**

GRAM NEGATIVE CHART

S.NO	Date	Name	Age/ Sex	Clinical Diagnosis	Bacterium	NF	AT	CX	FR	NA	FU	CR	GM	AK	CL	OF	CZ	FX	CN
33.	05/09/17	Kasi	56/m	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
34.	08/09/17	Kaviyarasu	55/m	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
35.	10/09/17	Ashraf	26/M	Soft tissue injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
36.	11/10/17	Jayaraj	55/m	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R
37.	18/10/17	Kumaran	67/m	Soft Tissue Injury	Klebsella pneumoniae	MS	R	HS	R	R	MS	HS	R	HS	R	HS	MS	HS	R

INFORMATION SHEET FOR THOSE WHO PLAN TO PARTICIPATE IN

THIS RESEARCH PROJECT

FORM 1

NAME OF THE RESEARCH PROJECT: "TO EVALUATE BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN ORAL AND MAXILLOFACIAL INJURIES FOLLOWING RTA"

We welcome you and thank you for having accepted our request to consider whether you/ your child/ your ward can participate in our study. This sheet contains the details of the study; the possible risks, discomforts and benefits for the participants. You can read and understand yourself; if you wish, we are ready to read and explain the same to you. If you do not understand anything or if you want any more details we are ready to provide the details.

Information to the participants:

What is the purpose of the study?

The aim of the study is to investigate the incidence of bacteriological profile and the antibiotic sensitivity pattern in oral and maxillofacial injuries due to RTA.

Who / where this study is being conducted?

This study is being conducted by **Dr. Ani John Peter** Post Graduate student belonging to Department of Oral and Maxillofacial Surgery under the guidance of Prof. Dr. K. PrabhuSankar., M.D.S., Head of the Department.

Why am I being considered as one of the participant?

Because of the injury present in the Head and Neck Region.

Should I definitely have to take part in this study?

No. If you do not wish to participate, you will not be included in this study. Also the dental treatments will continue without any prejudice.

If participating in this study, what are the responsibilities of the participant?

The participant may have to follow some simple rules.

Are there any benefits for the participants?

Yes. Infection reduced and treated with proper antibiotic.

Will there be any discomfort / risk to the participants?

No risks. No discomforts may be there.

Research discomfort : Minimal pain, minimal discomfort.

Will the participant be paid for the study?

No. The participant will not be paid.

While participating in this study, will the personal details of the participant be kept confidential?

Yes. Confidentiality will be maintained.

Will the participant be informed of this study's results and findings?

Yes. if needed , the participant can get details from us.

Can the participant withdraw from this study at any time during the study period?

Yes. The participant can withdraw at any time during the study period.

INFORMED CONSENT

Form for Getting Informed Consent for those Participating in the Research Project

(Form 2)

NAME OF THE RESEARCH PROJECT : "**TO EVALUATE BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN ORAL AND MAXILLOFACIAL INJURIES FOLLOWING RTA"**

I, the participant/ parent/ guardian,

.....

..... have been informed about the details of the study in my own language.

I, the participant/ parent/ guardian, have understood the details about the study.

I, the participant/ parent/ guardian, know the possible risks and benefits for me/ my child/ my ward, by taking part in the study.

I, the participant/ parent/ guardian understand that I can withdraw from the study at any point of time and even then , I/ my child/ my ward will continue to get the medical treatment as usual.

I, the participant/ parent/ guardian understand that I/ my child/ my ward will not get any payment for taking part in this study.

I, the participant/ parent/ guardian will not object if the results of this study are getting published in any medical journals, provided my/ my child's/ my ward's personal identity is not reviewed.

I know what I am/ my child/ my ward is supposed to do by taking part in this study and I, the participant/ parent/ guardian assure that full co-operation will be given for this study.

Signature/ Thumb impression of the participant/ parent/ guardian:

(Name and address)

.....

.....

.....

Signature/ Thumb impression of the witness:

(Name and address)

.....

.....

.....

Name & Signature if the investigator

.....

.....

ஆராய்ச்சி ஒப்புதல் படிவம்

விபத்தினால் ஏற்பட்ட காயத்தில் உள்ள கிருமிகளின் வகையை அறிய ஸ்வாப்டெஸ்ட் முறை மூலம் கண்டறிய ஒப்புதல் படிவம்.

நோயாளியின் பெயர் : தேதி :

வயது/பாலினம் : ஆராய்ச்சி சேர்க்கை எண் :

என்னுடைய சுய நினைவுடனும் மற்றும் முழுசுதந்திரத்துடனும் இந்த மருத்துவ ஆராய்ச்சியில் சேர்ந்து கொள்ள ஒப்புதல் அளிக்கிறேன். கீழ்க்காணும் நிபந்தனைகளுக்கு நான் ஒப்புக்கொள்கிறேன்.

இந்த சிகிச்சையின் போது என் விபத்து காயத்தில் இருந்து ஸ்வாப் டெஸ்ட் மூலம் கிருமிகளின் வகை கண்டறியப்படுகிறது என்பதை நான் நன்றாக அறிவேன்.

எனது உடல்நிலை பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத வழக்கத்திற்கு மாறான நோய்குறிகள் தென்பட்டாலோ அதனை உடனடியாக பல் மருத்துவரிடம் தெரிவிக்க சம்மதிக்கிறேன்.

எனது மருத்துவ குறிப்பேடுகளை இந்த ஆராய்ச்சியில் பயன்படுத்திக்கொள்ள சம்மதிக்கிறேன். இந்த ஆராய்ச்சி மையமும், மருத்துவமனையும், பல் மருத்துவ கல்லூரியும், ஆராய்ச்சியானரும் என்னுடைய விபரங்கள் அனைத்தும் இரகசியமாக வைப்பதாக அறிகிறேன்.

மேலும் இந்த ஆராய்ச்சிகளுக்காக தேவைப்படும் இரத்த பரிசோதனை, எக்ஸ்ரே மற்றும் புகைப்படங்கள் எடுக்க ஆராய்ச்சியாளரக்கு முழு அனுமதி அளிக்கிறேன்.

நோயாளியின் பெயர் : கையொப்பம் : தேதி :

ஆராய்ச்சியாளர் பெயர் : கையொப்பம் : தேதி :

ULTRA'S BEST DENTAL COLLEGE AND HOSPITAL, MADURAI

DEPARTMENT OF ORAL AND MAXILLOFACIAL SURGERY

THESIS CASE SHEET PROFORMA

Name of the Operator : Date:

Name of the Guide :

Name of the Patient : OP No:

Age : Occupation:

Gender : Marital Status:

Address : Date of Operation:

Chief complaint :

Present Medical History:

Past Medical History :

Personal History :

Family History :

Clinical Examination :1.General Examination

2.Local Examination

Extra oral

Intra Oral

Vomited : yes /no

Shock : Absent/ Mild/Severe

Airway :Clear/Obstructed Alcohol: yes/no

Vital Signs : Pulse

Blood pressure

Temp

Respiratory Rate

Level of Consciousness: Fully respond

Respond to simple command

Respond to Painful stimuli

Can not respond to stimuli

Amnesia : Pretraumatic

Post traumatic

Hemorrhage :

Laceration :

Tissue loss:

Abrasion:

Edema :

Ecchymosis:

Contour Defects:

Cranium :

Orbital Margins:

Nasal Bones :

Zygoma :

Condyles :

Mandibular Border :

Maxilla :

INTRA ORAL:

Missing Teeth

Teeth to be Extracted:

Teeth unsuitable for splinting:

Roots present:

Fractured Teeth :

ORAL HYGEINE : Good/ Fair/ Neglected

OCCLUSION at present

Prior to accident

Fracture Site

Maxilla Mandible Other facial bones

LACERATION / ECCHYMOSIS

X - ray's Required :

Oblique Mandible Occlusal

Dental

PA Jaws OPG

TOWNES

OCCIPITOMENTAL 15" - 30"

Lateral Skull

Impressions:

Photographs:

Any other Injuries

Soft Tissue Injuries:

Summary of Injuries

Skeletal Soft Tissue

Investigations

Haemogram Blood group

X- rays